United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the Regents of the University of California (Agricultural Experiment Station); the United States Department of the Interior, Bureau of Land Management; and the California Department of Forestry and Fire Protection, Soil-Vegetation Survey

# Soil Survey of Trinity County, California, Weaverville Area

# How To Use This Soil Survey

## General Soil Map

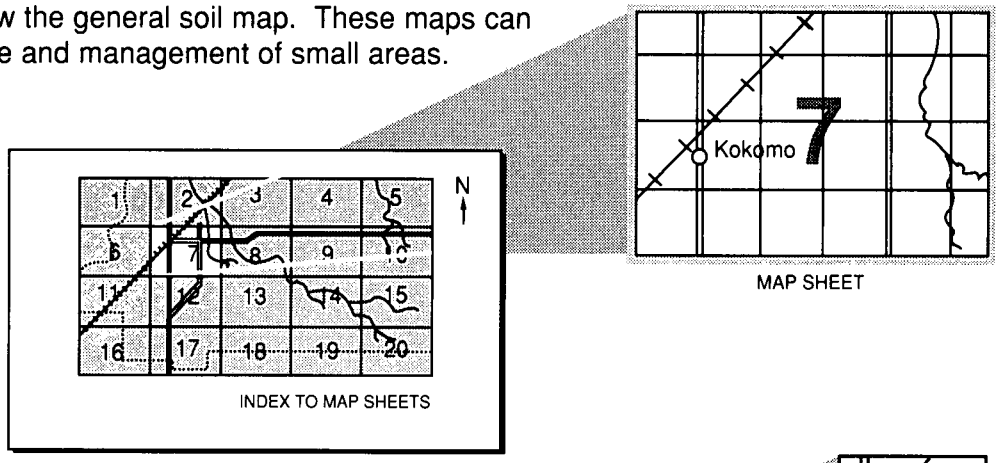
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

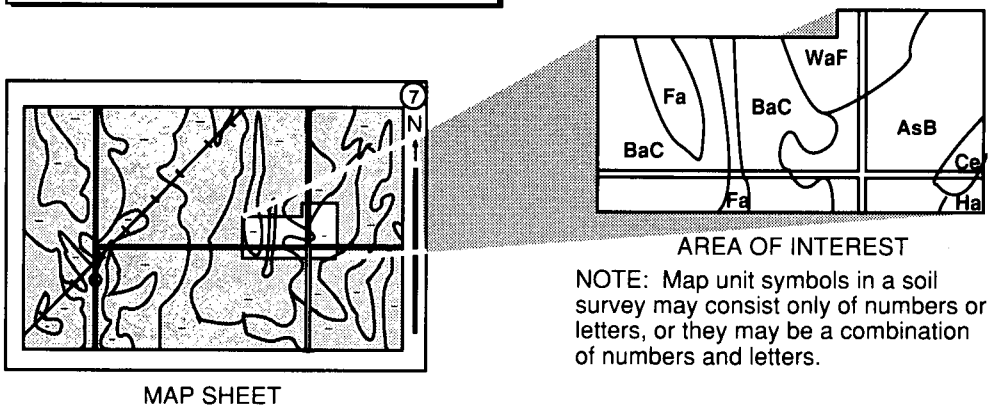
## Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.




Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.




NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1985. Soil names and descriptions were approved in 1990. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1985. This survey was made cooperatively by the Natural Resources Conservation Service; the Regents of the University of California (Agricultural Experiment Station); the United States Department of the Interior, Bureau of Land Management; and the California Department of Forestry and Fire Protection, Soil-Vegetation Survey. The survey is part of the technical assistance furnished to the Trinity County Resource Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

**Cover: Steep forested slopes dominate the survey area. Narrow valleys provide limited areas for irrigated agriculture or for homesite development. Dominant land uses are timber production, watershed areas, recreational areas, and wildlife habitat. Pictured is an area of Barpeak-Sheetiron complex, 50 to 90 percent slopes. Bully Choop Mountain is in the background.**

# Contents


**Index to map units** ..... iv
**Summary of tables** ..... vii
**Foreword** ..... ix
General nature of the survey area ..... 1
How this survey was made ..... 3
**General soil map units** ..... 5
**Detailed soil map units** ..... 11
**Prime farmland** ..... 107
**Use and management of the soils** ..... 109
Crops and pasture ..... 109
Watershed land management ..... 112
Woodland management and productivity ..... 113
Recreation ..... 117
Wildlife habitat ..... 118
Engineering ..... 119
**Soil properties** ..... 125
Engineering index properties ..... 125
Physical and chemical properties ..... 126
Soil and water features ..... 127
**Classification of the soils** ..... 129
Soil series and their morphology ..... 129
Atter series ..... 129
Azule series ..... 130
Bamtush series ..... 131
Bamtush Variant ..... 132
Barpeak series ..... 133
Beargulch series ..... 133
Brockgulch series ..... 134
Brockgulch Variant ..... 135
Brownbear series ..... 135
Brownscreek series ..... 136
Cargent series ..... 137
Caris series ..... 138
Carrcreek series ..... 138
Choop series ..... 139
Crefork series ..... 140
Dedrick series ..... 141
Demogul series ..... 142
Dougcity series ..... 142
Dubakella series ..... 143
Etsel series ..... 144
Goulding series ..... 144
Haploxerolls ..... 145
Haysum series ..... 146
Holkat series ..... 146
Holkat Variant ..... 147
Hoosimbim series ..... 148
Hotaw series ..... 148
Indleton series ..... 149
Jafa series ..... 150
Marpa series ..... 151
Marpa Variant ..... 151
Millsholm series ..... 152
Minersville series ..... 152
Minersville Variant ..... 153
Musserhill series ..... 153
Musserhill Variant ..... 154
Pardaloe series ..... 155
Sheetiron series ..... 156
Sheetiron Variant ..... 156
Skyrock series ..... 157
Skyrock Variant ..... 157
Springgulch series ..... 158
Tallowbox series ..... 159
Valcreek series ..... 160
Vanvor series ..... 161
Vitzthum series ..... 161
Weaverville series ..... 162
Weitchpec series ..... 163
Weitchpec Variant ..... 163
Xeralfs ..... 164
Xererts ..... 165
Xerofluvents ..... 165
Xerorthents ..... 166
**Formation of the soils** ..... 167
Factors of soil formation ..... 167
Processes of soil formation ..... 169
**References** ..... 173
**Glossary** ..... 179
**Appendixes** ..... 193
**Tables** ..... 217


Issued January 1998

# Index to Map Units


101—Atter extremely gravelly loamy sand, 9 to 15 percent slopes ..... 12
102—Atter-Dumps, dredge tailings-Xerofluvents complex, 2 to 9 percent slopes ..... 12
103—Bamtush-Brownbear complex, 15 to 30 percent slopes ..... 14
104—Bamtush-Brownbear complex, 50 to 75 percent slopes ..... 14
105—Bamtush-Brownbear-Weaverville complex, 30 to 75 percent slopes ..... 15
106—Bamtush-Weaverville complex, 15 to 30 percent slopes ..... 17
107—Bamtush-Weaverville-Brownbear complex, 15 to 50 percent slopes ..... 18
109—Barpeak-Sheetiron complex, 50 to 90 percent slopes ..... 19
110—Beargulch-Skyrock complex, 50 to 75 percent slopes ..... 20
111—Brockgulch-Dedrick-Brownbear complex, 50 to 75 percent slopes ..... 21
112—Brownbear-Bamtush complex, 30 to 50 percent slopes ..... 22
113—Brownscreek gravelly loam, 30 to 50 percent slopes ..... 23
114—Brownscreek gravelly loam, 50 to 75 percent slopes ..... 24
115—Brownscreek-Dedrick complex, 50 to 75 percent slopes ..... 24
116—Brownscreek-Dougcity complex, 30 to 50 percent slopes ..... 25
117—Brownscreek-Dougcity complex, 50 to 75 percent slopes ..... 26
118—Cargent-Demogul association, 50 to 75 percent slopes ..... 27
119—Cargent-Demogul association, 75 to 90 percent slopes ..... 28
120—Caris extremely gravelly sandy loam, 50 to 75 percent slopes ..... 29
121—Caris extremely gravelly sandy loam, 75 to 90 percent slopes ..... 30
122—Caris-Indleton-Hoosimbim complex, 50 to 75 percent slopes ..... 30
123—Carrcreek gravelly loam, 0 to 2 percent slopes ..... 31
124—Carrcreek gravelly loam, 2 to 5 percent slopes ..... 32
125—Choop fine gravelly loamy coarse sand, 50 to 75 percent slopes ..... 32
126—Choop-Rock outcrop complex, 50 to 90 percent slopes ..... 33
127—Crefork loam, 2 to 9 percent slopes ..... 33
128—Crefork loam, 9 to 15 percent slopes ..... 34
129—Crefork clay loam, 15 to 30 percent slopes ..... 35
131—Crefork-Musserhill complex, 30 to 50 percent slopes ..... 36
132—Dedrick gravelly loam, 50 to 75 percent slopes ..... 37
133—Dedrick-Rock outcrop complex, 50 to 75 percent slopes ..... 37
134—Demogul gravelly loam, 50 to 75 percent slopes ..... 38
136—Dougcity-Dedrick complex, 50 to 75 percent slopes ..... 38
137—Dougcity-Demogul complex, 50 to 75 percent slopes ..... 39
138—Dubakella cobbly clay loam, 15 to 30 percent slopes ..... 40
139—Dubakella cobbly clay loam, 30 to 50 percent slopes ..... 41
140—Dubakella cobbly clay loam, 50 to 75 percent slopes ..... 42
141—Dubakella stony loam, 30 to 50 percent slopes ..... 42
142—Etsel very gravelly loam, 30 to 50 percent slopes ..... 43
143—Etsel-Bamtush complex, 50 to 75 percent slopes ..... 43
144—Etsel-Weitchpec complex, 50 to 75 percent slopes ..... 44
145—Goulding-Holkat Variant-Marpa Variant complex, 50 to 75 percent slopes ..... 45
146—Goulding-Vitzthum-Vanvor complex, 50 to 75 percent slopes ..... 46
147—Haploxerolls, warm, 0 to 2 percent slopes ..... 48

148—Haploxerolls, 2 to 9 percent slopes ..... 48
149—Haysum loam, 5 to 9 percent slopes..... 49
150—Haysum gravelly loam, 0 to 2 percent slopes..... 49
151—Haysum gravelly loam, 2 to 5 percent slopes..... 50
152—Haysum gravelly loam, 5 to 9 percent slopes..... 50
153—Holkat-Hoosimbim complex, 30 to 50 percent slopes ..... 52
154—Holkat-Hoosimbim complex, 50 to 75 percent slopes ..... 52
155—Holkat Variant-Dedrick association, 50 to 75 percent slopes ..... 53
156—Hoosimbim gravelly loam, 30 to 50 percent slopes..... 54
157—Hoosimbim-Bamtush-Marpa complex, 30 to 50 percent slopes ..... 55
158—Hoosimbim-Etsel complex, 30 to 50 percent slopes..... 56
159—Hoosimbim-Goulding complex, 50 to 75 percent slopes ..... 57
160—Hotaw loam, 15 to 30 percent slopes ..... 58
161—Hotaw loam, 30 to 50 percent slopes ..... 59
162—Indleton-Caris-Hoosimbim complex, 50 to 75 percent slopes ..... 59
163—Jafa loam, 0 to 5 percent slopes ..... 61
164—Jafa loam, 5 to 15 percent slopes ..... 61
165—Jafa gravelly loam, 0 to 2 percent slopes..... 62
166—Jafa gravelly loam, 2 to 9 percent slopes..... 62
167—Jafa gravelly loam, clayey substratum, 15 to 30 percent slopes ..... 63
170—Marpa-Hoosimbim complex, 30 to 50 percent slopes ..... 64
171—Marpa-Hoosimbim-Bamtush complex, 50 to 75 percent slopes ..... 65
172—Marpa-Vitzthum complex, 50 to 75 percent slopes..... 66
173—Marpa Variant-Goulding-Holkat Variant complex, 30 to 50 percent slopes ..... 67
175—Millsholm loam, 5 to 9 percent slopes..... 68
176—Millsholm-Azule complex, 15 to 30 percent slopes..... 69
177—Minersville sandy loam, 50 to 75 percent slopes..... 69
178—Minersville Variant-Choop complex, 50 to 75 percent slopes ..... 70
179—Musserhill gravelly loam, 15 to 30 percent slopes..... 71
180—Musserhill gravelly loam, 30 to 50 percent slopes..... 72
181—Musserhill-Weaverville complex, 15 to 30 percent slopes ..... 72
182—Musserhill-Weaverville complex, 30 to 50 percent slopes ..... 74
183—Musserhill-Weaverville-Urban land complex, 9 to 30 percent slopes ..... 75
184—Musserhill Variant loam, 30 to 50 percent slopes..... 76
185—Pardaloe-Dedrick association, 50 to 75 percent slopes ..... 77
186—Pardaloe-Goulding complex, 50 to 75 percent slopes ..... 78
188—Rock outcrop..... 79
189—Rock outcrop-Dedrick complex, 75 to 90 percent slopes ..... 79
190—Sheetiron extremely gravelly loam, 75 to 90 percent slopes ..... 80
191—Sheetiron-Barpeak complex, 50 to 90 percent slopes ..... 80
192—Sheetiron Variant-Dedrick complex, 50 to 75 percent slopes ..... 81
193—Skyrock extremely gravelly loam, 50 to 75 percent slopes ..... 82
194—Skyrock-Rock outcrop complex, 50 to 75 percent slopes ..... 82
195—Skyrock Variant-Rock outcrop complex, 30 to 50 percent slopes..... 83
196—Skyrock Variant-Rock outcrop-Rubble land complex, 50 to 75 percent slopes ..... 84
197—Springgulch-Brockgulch Variant complex, 30 to 50 percent slopes..... 84

198—Tallowbox-Minersville complex, 30 to 50 percent slopes ..... 85
199—Tallowbox-Minersville complex, 50 to 75 percent slopes ..... 86
201—Urban land-Xeralfs complex, 5 to 30 percent slopes ..... 88
202—Valcreek-Choop complex, 30 to 75 percent slopes ..... 88
203—Valcreek-Minersville complex, 30 to 75 percent slopes ..... 89
204—Valcreek-Minersville-Choop complex, 30 to 75 percent slopes ..... 92
205—Vanvor-Hoosimbim complex, 30 to 50 percent slopes ..... 93
206—Vanvor-Hoosimbim complex, 50 to 75 percent slopes ..... 94
207—Vitzthum-Cargent complex, 50 to 75 percent slopes ..... 95
208—Weaverville loam, 9 to 30 percent slopes ..... 96
209—Weaverville loam, 30 to 50 percent slopes ..... 96
210—Weitchpec-Dubakella complex, 30 to 50 percent slopes ..... 97
211—Weitchpec Variant-Bamtush Variant complex, 9 to 50 percent slopes ..... 98
212—Weitchpec Variant-Bamtush Variant complex, 50 to 75 percent slopes ..... 99
213—Xeralfs-Xerorthents complex, 5 to 50 percent slopes ..... 100
215—Xererts, 2 to 15 percent slopes ..... 101
216—Xererts-Haysum complex, 2 to 5 percent slopes ..... 103
217—Xerofluvents-Riverwash complex, 0 to 5 percent slopes ..... 103
218—Xerorthents-Rock outcrop complex, 2 to 15 percent slopes ..... 104
219—Xerorthents-Rock outcrop complex, 15 to 75 percent slopes ..... 105

# Summary of Tables

Temperature and precipitation (table 1) ..... 218

Freeze dates in spring and fall (table 2) ..... 219

Acreage and proportionate extent of the soils (table 3) ..... 220

Prime farmland (table 4) ..... 222

Land capability (table 5) ..... 223

Woodland productivity (table 6) ..... 231

Woodland management concerns (table 7) ..... 245

Recreational development (table 8) ..... 254

Building site development (table 9) ..... 268

Sanitary facilities (table 10) ..... 281

Construction materials (table 11) ..... 295

Water management (table 12) ..... 309

Engineering index properties (table 13) ..... 321

Physical and chemical properties of the soils (table 14) ..... 351

Soil and water features (table 15) ..... 364

Classification of the soils (table 16) ..... 371

# Foreword

This soil survey contains information that can be used in land-planning programs in Trinity County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Foresters, farmers, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are shallow to bedrock. Clayey soils are poorly suited to use as septic tank absorption fields. Managing soils on extremely steep slopes requires careful planning.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Hershel R. Read
State Conservationist
Natural Resources Conservation Service

# Soil Survey of Trinity County, California, Weaverville Area

By David W. Howell, Natural Resources Conservation Service

Fieldwork by David W. Howell, Wesley C. Lindsey, and John K. Wachtell, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Regents of the University of California (Agricultural Experiment Station); the United States Department of the Interior, Bureau of Land Management; and the California Department of Forestry and Fire Protection, Soil-Vegetation Survey

The survey area is in the northwestern part of California (fig. 1). The total area is 196,000 acres. Weaverville, the largest town in the area, is in a valley along the southern edge of the Trinity Alps.

The survey area is bounded on the east by Shasta County and on the south, west, and north by the Shasta-Trinity National Forest. Also, the Hayfork Valley part is separated from the rest of the survey area by areas of the Shasta-Trinity National Forest.

In addition to Weaverville, the survey area includes the towns of Hayfork, Lewiston, Junction City, and Douglas City. It is part of the Klamath Mountains and is characterized by parallel mountain ridges with intervening valleys of varying size. Elevations range from 1,300 to 7,000 feet. The area is drained primarily by the Trinity River and Hayfork Creek.

Timber production is the main land use in the mountainous areas. Some of the valleys are used for irrigated forage crops, which are harvested for hay. Some areas are used for grazing. Homesite development occurs throughout the area.

Watershed is also a major land use in the survey area. The Trinity River watershed produces significant runoff that slows in the Trinity River, thereby benefiting many people and many ecosystems.

The areas around the towns of Hayfork, Lewiston, and Weaverville were mapped in more detail than the surrounding mountainous areas. These more densely populated areas have more intensive land use patterns and smaller parcel sizes. In these areas, smaller soil bodies were identified and more investigations were made to determine the distribution of the soils.

Access was denied for soil mapping in a small, irregularly shaped area in parts of sections 9, 10, 15, and 16, T. 31 N., R. 12 W., in the western part of the Hayfork Valley. The delineations on the soil maps in these areas were projected from previous mapping by the California Department of Forestry and Fire Protection, Soil-Vegetation Survey, and from previously allowed soil survey fieldwork by the Natural Resources Conservation Service during requested assistance with conservation planning.

## General Nature of the Survey Area

This section contains general information about the survey area. It describes the physiography, relief, and drainage of the area and the climate.

### Physiography, Relief, and Drainage

The survey area is in the southern part of the Klamath Mountains. The area is made up of very steep, uplifted, folded mountain ridges. These mountains are

**Figure 1.—Location of the survey area in California.**

composed of complex metamorphosed sedimentary and volcanic rocks intruded by igneous rocks. Between the mountain ridges are narrow valleys. These valleys have side slopes of nonmarine sediments and terrace deposits. The valley floors are recent alluvium.

The drainageways in the mountainous areas are deep, V-shaped canyons in the areas of metamorphic rocks. U-shaped or rounded drainageways are in areas of granitic rocks.

Much of the survey area is located near the headwaters of the Trinity River and its tributaries. The steep, forested lands in the area receive large amounts of precipitation. They deliver a large portion of runoff to the Trinity River. The survey area is drained primarily by the Trinity River and Hayfork Creek.

## Climate

The survey area has hot, dry summers and moderate winters. Most precipitation results from major storms moving inland from the Pacific Ocean, but a few short thundershowers occur in most summers. Local air flow is strongly controlled by the deeply dissected mountains. The higher mountain ridges receive precipitation in the form of snow and hold it into late spring. The lower elevations receive most precipitation as rain, but they also receive some snowfall during most winters. The average annual precipitation ranges from about 30 inches at the lower elevations to more than 70 inches on the highest mountain slopes (fig. 2). Dense morning fog fills the lower Trinity River basin during much of the winter and occasionally during the rest of the year.

Summer temperatures are highest on the lower valley floors. Temperatures generally decrease as elevation increases. Aspect and exposure of the steep slopes and deep valleys influence temperatures. Slopes that face south or west warm more quickly in the spring than slopes that face north or east and are generally hotter throughout the year.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Weaverville in the period 1948 to 1988. The average annual air temperature ranges from about 58 degrees F at the lower elevations, on steep, south-facing slopes, to about 44 degrees at the higher elevations. The average minimum temperature in January ranges from about 29 degrees F at the lower elevations to 20 degrees at the higher elevations. The average maximum temperature in July ranges from about 97 degrees F in the valleys to about 90 degrees at the higher elevations.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F).

Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. The growing season is the interval between the last temperature of 32 degrees F or cooler in the spring and the first temperature of 32 degrees F or cooler in the fall. It is generally a maximum of 130 to 180 days in the lower areas near Blanchard Flat. Most of the survey area has a growing season of 90 to 130 days, but some of the higher mountain slopes have a growing season of only 70 to 90 days. The growing season varies locally because of variations in cold air drainage. The timing of the first and last frosts is quite variable from one area to another. Generally, frost can be expected to occur from October through May or June. Some areas that trap

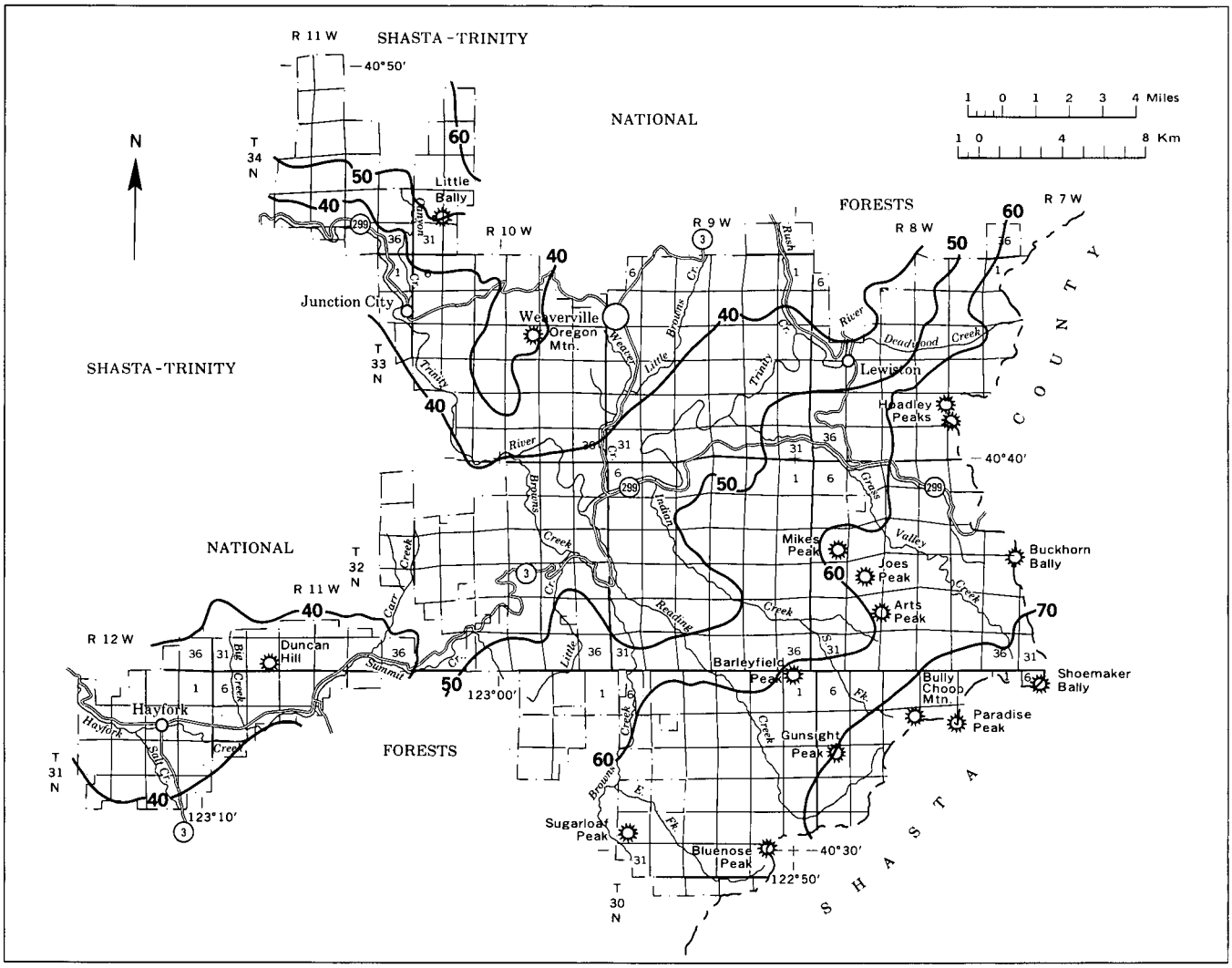



**Figure 2.—Average annual precipitation (in inches).**

cold air or receive cold air flow from high mountain areas nearby may have sporadic frosts through June and even July in some years.

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of

accuracy the kind of soil or miscellaneous area at a specific location on the landscape (Hausenbuiller, 1974).

Individual soils on the landscape commonly merge gradually into one another as their characteristics change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on forest yields are assembled from measurements on many trees growing on each soil and compared with field measurements on the same kinds of soil in other locations (Heilman and others, 1981; Hobbs and Helgerson, 1981; Laacke, 1979; McNabb and Campbell, 1985; McNabb and Froehlich, 1983; Pritchett, 1979; Strothmann and Roy, 1984; Sudworth, 1967).

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date (Hillel, 1971).

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Some of the descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in the adjacent Shasta-Trinity National Forest survey area. The Shasta-Trinity National Forest Area was mapped at a lower intensity than this survey; the soils were defined in broader terms. In the Hayfork Valley area, a major physiographic boundary occurs along much of the National Forest boundary. Soils on the steep mountain slopes in the National Forest differ from the soils on the adjacent terraces and hills that are within this survey area.

# General Soil Map Units

The general soil map included with this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general soil map units in this survey have been grouped for broad interpretive purposes. Each of the broad groups and the map units in each group are described on the following pages.

## Soil Descriptions

### Nearly Level to Steep, Moderately Deep to Very Deep Soils That Are Well Drained; On Stream Terraces, Alluvial Fans, and Hills

#### 1. Carrcreek-Haysum

*Nearly level to moderately sloping, very deep gravelly loam that formed in alluvium; on stream terraces and alluvial fans*

This unit is in Hayfork Valley along Hayfork, Carr, and Big Creeks. The native vegetation is oaks, brush, and grasses. Elevation ranges from 1,900 to 2,600 feet. The average annual precipitation is 30 to 40 inches. The average annual air temperature is about 54 degrees F. The average frost-free season is about 110 days.

This unit makes up about 3 percent of the survey area. It is about 38 percent Carrcreek and similar soils, 26 percent Haysum and similar soils, and 36 percent components of minor extent.

The surface layer of the Carrcreek soils is gravelly loam. The subsoil is very gravelly clay loam and very gravelly sandy clay loam.

The surface layer of the Haysum soils is gravelly loam. The subsoil is gravelly clay loam underlain by very gravelly sandy clay loam.

Of minor extent in this unit are Jafa and Atter soils, Xerofluvents, and Riverwash.

Most areas of this unit are used as pastureland or hayland or for homesite development. Few limitations affect these uses.

#### 2. Crefork-Musserhill

*Gently sloping to steep, moderately deep and very deep clay loam and gravelly loam that formed in weakly consolidated sediments; on hills*

This unit is on hills in Hayfork Valley, Weaverville, Junction City, Blanchard Flat, and Lewiston. The native vegetation is grasses, brush, oaks, and conifers. Elevation ranges from 1,800 to 3,900 feet. The average annual precipitation is 30 to 40 inches. The average annual air temperature is about 54 degrees F. The average frost-free season is about 110 days.

This unit makes up about 9 percent of the survey area. It is about 32 percent Crefork and similar soils, 27 percent Musserhill and similar soils, and 41 percent components of minor extent.

The Crefork soils are very deep. The surface layer is clay loam. The subsoil is clay underlain by gravelly clay loam.

The Musserhill soils are moderately deep. The surface layer is gravelly loam. The subsoil is very gravelly clay loam and extremely cobbly clay loam over weakly consolidated conglomerate.

Of minor extent in this unit are Weaverville, Musserhill Variant, Atter, Hoosimbim, and Jafa soils, Xeralfs, Xererts, and areas of Urban land. Weaverville soils are susceptible to landslides.

Most areas of this unit are used for wood products,

timber production, pastureland, or homesite development. The main limitation affecting the harvesting of wood products is the clay subsoil of the Crefork soils, which results in low strength during wet periods. The low strength hinders the use of roads. Surface compaction is a limitation affecting the harvesting of timber. Restricted permeability, low strength, and a high shrink-swell potential are concerns in areas used for homesite development. Erosion is an additional hazard in the steeper areas.

### 3. Jafa-Hoosimbim

*Nearly level to steep, deep and very deep loam and gravelly loam that formed in alluvium and weakly consolidated conglomerate; on hills and terraces*

This map unit is in Hayfork Valley. The native vegetation is dominated by conifers. Elevation ranges from 2,300 to 3,000 feet. The average annual precipitation is 35 to 65 inches. The average annual air temperature is about 54 degrees F. The frost-free season is about 110 days.

This unit makes up about 2 percent of the survey area. It is about 53 percent Jafa and similar soils, 19 percent Hoosimbim and similar soils, and 28 percent components of minor extent.

The Jafa soils are very deep. They formed in alluvium. The surface layer is loam. The subsoil is gravelly clay loam.

The Hoosimbim soils are deep. The surface layer is gravelly loam. The subsoil is very gravelly clay loam over weakly consolidated conglomerate.

Of minor extent in this unit are Crefork, Holkat, Weaverville, Musserhill, and Dubakella soils.

Most areas of this unit are used for timber production or homesite development. A few areas of Jafa soils are used as pastureland. The main limitations affecting the harvesting of timber are the slope, a severe hazard of erosion, and the low available water capacity of the Hoosimbim soils. The main limitations affecting homesite development are the slope and restricted permeability. The main limitation affecting pastureland is a moderate hazard of erosion in the steeper areas of the Jafa soils.

## Strongly Sloping to Extremely Steep, Shallow To Very Deep Soils That Are Well Drained to Excessively Drained; On Mountains and Hills

### 4. Caris-Bamtush-Hoosimbim

*Steep to extremely steep, moderately deep to very deep, well drained extremely gravelly sandy loam and extremely gravelly loam that formed in material weathered from metavolcanic, sedimentary, and metasedimentary rocks*

This unit occurs throughout the survey area. The native vegetation is dominated by conifers. Elevation ranges from 1,800 to 4,900 feet. The average annual precipitation is 30 to 65 inches. The average annual air temperature is about 50 degrees F. The frost-free season is about 110 days.

This unit makes up about 24 percent of the survey area. It is about 27 percent Caris and similar soils, 20 percent Bamtush and similar soils, 17 percent Hoosimbim and similar soils, and 36 percent components of minor extent.

The Caris soils are moderately deep. The surface layer is extremely gravelly sandy loam. The subsoil and substratum are extremely gravelly loam and extremely gravelly sandy loam over fractured metasedimentary rock.

The Bamtush soils are very deep. The surface layer is extremely gravelly loam. The subsoil is very gravelly loam and very gravelly sandy clay loam.

The Hoosimbim soils are deep. The surface layer is extremely gravelly sandy loam. The subsoil is very gravelly sandy clay loam and extremely gravelly sandy clay loam.

Of minor extent in this unit are Marpa, Indleton, Holkat, Brownbear, Etsel, Vitzthum, and Atter soils and Xerofluvents.

Most areas of this unit are used for timber production. The main limitations are the slope, a severe or very severe hazard of erosion, a low or very low available water capacity, and rock fragments on the surface.

### 5. Goulding-Vitzthum-Vanvor

*Steep and very steep, somewhat excessively drained and well drained, shallow and moderately deep very gravelly loam, very gravelly sandy clay loam, and extremely gravelly loam that formed in material weathered from metamorphic rocks*

This unit occurs throughout the survey area. The native vegetation is dominated by brush and hardwoods. The unit is mainly on south-facing slopes. Elevation ranges from 1,700 to 4,200 feet. The average annual precipitation is 30 to 60 inches. The average annual air temperature is about 55 degrees F. The frost-free season is about 110 days.

This unit makes up about 3 percent of the survey area. It is about 32 percent Goulding and similar soils, 23 percent Vitzthum and similar soils, 16 percent Vanvor and similar soils, and 29 percent components of minor extent.

The Goulding soils are shallow and are somewhat

excessively drained. The surface layer is very gravelly loam. The subsoil is extremely gravelly loam over fractured metavolcanic rock.

The Vitzthum soils are shallow and are somewhat excessively drained. The surface layer is extremely gravelly loam. The subsoil is extremely gravelly sandy clay loam over fractured metavolcanic rock.

The Vanvor soils are moderately deep and are well drained. The surface layer is very gravelly sandy clay loam. The subsoil is very gravelly sandy clay loam, very gravelly clay loam, and extremely gravelly clay loam over fractured schist.

Of minor extent in this unit are Marpa, Bamtush, Holkat Variant, Hoosimbim, Marpa Variant, and Pardaloe soils.

Most areas of this unit serve as watershed or are used as recreational areas or wildlife habitat. The main management concerns are a severe hazard of erosion, the slope, the shallow depth to rock, and a very low available water capacity.

### 6. Dubakella-Weitchpec

*Moderately steep to very steep, moderately deep, well drained gravelly loam and cobbly clay loam that formed in material weathered from ultrabasic and serpentinitic rocks*

This unit occurs in the central part of the survey area. The native vegetation is dominated by sparse stands of hardwoods, brush, and scattered conifers. Elevation ranges from 1,600 to 4,700 feet. The average annual precipitation is 30 to 60 inches. The average annual air temperature is about 48 degrees F. The frost-free season is about 110 days.

This unit makes up about 1 percent of the survey area. It is about 70 percent Dubakella and similar soils, 10 percent Weitchpec and similar soils, and 20 percent components of minor extent.

The Dubakella soils are moderately deep. The surface layer is cobbly clay loam. The subsoil is very cobbly clay loam and very cobbly clay over fractured serpentinitic rock.

The Weitchpec soils are moderately deep. The surface layer is gravelly loam. The substratum is very gravelly loam over fractured serpentinitic rock.

Of minor extent in this unit are Demogul, Dougcity, Hoosimbim, Bamtush, and Marpa soils.

Most areas of this unit are used for timber production. Some areas serve as watershed and provide wildlife habitat. The main limitations affecting the production and harvesting of timber are a nutrient imbalance derived from the serpentinitic bedrock, the potential for mass movement, and a low available water capacity. In very steep areas the hazard of erosion is severe.

### 7. Brownscreek-Dougcity-Barpeak

*Moderately steep to extremely steep, moderately deep and very deep, well drained gravelly loam and very gravelly loam that formed in material weathered from mica schist*

This unit occurs mostly in the southern part of the survey area. The native vegetation is dominated by conifers. Elevation ranges from 1,700 to 6,974 feet. The average annual precipitation is 30 to 70 inches. The average annual air temperature is about 50 degrees F. The frost-free season is about 100 days.

This unit makes up about 26 percent of the survey area. It is about 35 percent Brownscreek and similar soils, 17 percent Dougcity and similar soils, 11 percent Barpeak and similar soils, and 37 percent components of minor extent.

The Brownscreek soils are moderately deep. The surface layer is gravelly loam. The subsoil is very gravelly loam, very gravelly clay loam, and extremely gravelly loam over fractured mica schist.

The Dougcity soils are very deep. The surface layer is gravelly loam. The subsoil is very gravelly loam and very gravelly clay loam.

The Barpeak soils are very deep. The surface layer is very gravelly loam. The subsoil is very gravelly sandy loam, extremely gravelly sandy loam, and extremely gravelly sandy clay loam.

Of minor extent in this unit are Sheetiron, Beargulch, Skyrock, Demogul, Cargent, and Atter soils.

Most areas of this unit are used for timber production. Some areas serve as watershed or are used as recreational areas or wildlife habitat. The main limitations affecting the harvesting of timber are the slope, a severe or very severe hazard of erosion in the steeper areas, and a low or very low available water capacity.

### 8. Minersville-Tallowbox-Valcreek

*Steep and very steep, moderately deep and deep, well drained and excessively drained sandy loam, gravelly coarse sandy loam, and very gravelly loamy coarse sand that formed in material weathered from granitic rocks*

This unit occurs mostly in the eastern part of the survey area. The native vegetation is dominated by conifers. Elevation ranges from 2,100 to 6,000 feet. The average annual precipitation is 40 to 65 inches. The average annual air temperature is about 47 degrees F. The frost-free season is about 100 days.

This unit makes up about 13 percent of the survey area. It is about 27 percent Minersville and similar soils,

25 percent Tallowbox and similar soils, 17 percent Valcreek soils, and 31 percent components of minor extent.

The Minersville soils are deep and are well drained. The surface layer is sandy loam. The subsoil and the substratum are sandy loam, fine gravelly coarse sandy loam, and very gravelly coarse sandy loam over weathered granitic rock.

The Tallowbox soils are moderately deep and are well drained. The surface layer is gravelly coarse sandy loam. The subsoil is gravelly coarse sandy loam over weathered granitic rock.

The Valcreek soils are moderately deep and are excessively drained. The surface layer is very gravelly loamy coarse sand. The underlying material is fine gravelly loamy coarse sand and extremely gravelly loamy coarse sand over weathered granitic rock.

Of minor extent in this unit are Hotaw and Bamtush soils, Haploxerolls, Xerofluvents, and Riverwash.

Most areas of this unit are used for timber production. Some areas serve as watershed or are used as recreational areas or wildlife habitat. The main management concerns are a very severe hazard of erosion, the slope, and a very low to moderate available water capacity. Special erosion-control measures are required in areas of these soils.

### 9. Weitchpec Variant-Bamtush Variant-Dubakella

*Strongly sloping to very steep, deep and very deep, well drained gravelly loam, very gravelly loam, and cobbly clay loam that formed in material weathered from serpentinitic and ultrabasic rocks*

This unit occurs in the eastern part of the survey area. The native vegetation is dominated by conifers. Elevation ranges from 2,000 to 4,400 feet. The average annual precipitation is 30 to 65 inches. The average annual air temperature is about 47 degrees F. The frost-free season is about 110 days.

This unit makes up about 2 percent of the survey area. It is about 33 percent Weitchpec Variant and similar soils, 23 percent Bamtush Variant and similar soils, 14 percent Dubakella and similar soils, and 30 percent components of minor extent.

The Weitchpec Variant soils are deep. The surface layer is gravelly loam. The subsoil and the substratum are very gravelly clay loam and extremely gravelly clay loam over ultrabasic rock.

The Bamtush Variant soils are very deep. The surface layer is very gravelly loam. The subsoil is very gravelly loam, very gravelly clay loam, extremely gravelly clay loam, and extremely gravelly clay.

The Dubakella soils are moderately deep. The surface layer is cobbly clay loam. The subsoil is very cobbly clay over serpentinitic and ultrabasic rock.

Of minor extent in this unit are Bamtush, Holkat, Hoosimbim, and Marpa soils.

Most areas of this unit are used for timber production. The main limitations affecting the harvesting of timber are the slope, a severe hazard of erosion, and a moderate or low available water capacity.

### 10. Brownbear-Bamtush-Weaverville

*Strongly sloping to very steep, moderately deep and very deep, well drained loam, very gravelly loam, and extremely gravelly loam that formed in material weathered from metavolcanic rocks and sediments*

This unit occurs mostly in the area around Oregon Mountain. The native vegetation is dominated by conifers. Elevation ranges from 1,750 to 4,400 feet. The average annual precipitation is 30 to 60 inches. The average annual air temperature is about 51 degrees F. The frost-free season is about 110 days.

This unit makes up about 5 percent of the survey area. It is about 34 percent Brownbear and similar soils, 21 percent Bamtush and similar soils, 13 percent Weaverville and similar soils, and 32 percent components of minor extent.

The Brownbear soils are moderately deep. The surface layer is very gravelly loam. The subsoil and the substratum are very gravelly loam, gravelly clay loam, very gravelly clay loam, and extremely gravelly clay loam over fractured schist.

The Bamtush soils are very deep. The surface layer is extremely gravelly loam. The subsoil is very gravelly loam and very gravelly sandy clay loam.

The Weaverville soils are very deep. The surface layer is loam. The subsoil is gravelly loam and gravelly clay loam underlain by thin layers of very gravelly clay loam.

Of minor extent in this unit are Hotaw, Brownscreek, Etsel, and Hoosimbim soils and areas of Rock outcrop.

Most areas of this unit are used for timber production. The main limitations are the slope, a severe hazard of erosion in the steeper areas, and a low available water capacity in the Bamtush and Brownbear soils. The Weaverville soils are susceptible to landslides.

## Gently Sloping to Extremely Steep, Shallow to Very Deep Soils That Are Well Drained and Somewhat Excessively Drained; On Mountains

### 11. Dedrick-Brockgulch-Pardaloe

*Very steep and extremely steep, shallow, moderately deep, and very deep, somewhat excessively drained and*

*well drained very gravelly loam that formed in material weathered from metamorphic rocks*

This unit occurs mostly in the area north of Junction City. The native vegetation consists of conifers, hardwoods, and brush. Elevation ranges from 1,300 to 4,000 feet. The average annual precipitation is 30 to 55 inches. The average annual air temperature is about 57 degrees F. The frost-free season is about 110 days.

This unit makes up about 10 percent of the survey area. It is about 28 percent Dedrick and similar soils, 20 percent Brockgulch and similar soils, 13 percent Pardaloe and similar soils, and 39 percent components of minor extent.

The Dedrick soils are shallow and are somewhat excessively drained. The surface layer is very gravelly loam. The subsoil is extremely gravelly loam over fractured schist.

The Brockgulch soils are moderately deep and are well drained. The surface layer is very gravelly loam. The subsoil and the substratum are very gravelly loam and extremely gravelly loam over fractured schist.

The Pardaloe soils are very deep and are well drained. The surface layer is very gravelly loam. The subsoil is very gravelly loam and extremely gravelly sandy clay loam.

Of minor extent in this unit are Atter, Brownbear, Goulding, and Holkat Variant soils, Xerofluvents, and areas of Rock outcrop.

Most areas of this unit serve as watershed or are used as recreational areas or wildlife habitat. Some areas are used for timber production. The main management concerns are a severe hazard of erosion, the slope, the shallow depth to bedrock, and a very low available water capacity.

### 12. Springgulch-Brockgulch Variant

*Steep, moderately deep and very deep, well drained loam and gravelly clay loam that formed in material weathered from mica schist*

This unit occurs near Indian Creek. The native vegetation is dominated by brush. Elevation ranges from 2,400 to 3,100 feet. The average annual precipitation is 40 to 50 inches. The average annual air temperature is about 60 degrees F. The frost-free season is about 150 days.

This unit makes up about 1 percent of the survey area. It is about 53 percent Springgulch and similar soils, 27 percent Brockgulch Variant and similar soils, and 20 percent components of minor extent.

The Springgulch soils are very deep. The surface layer is gravelly clay loam. The subsoil is gravelly clay loam and very gravelly clay loam.

The Brockgulch Variant soils are moderately deep. The surface layer is loam. The subsoil is gravelly clay loam, very gravelly clay loam, and very gravelly loam over fractured mica schist.

Of minor extent in this unit are Dougcity, Brownscreek, Millsholm, and Atter soils and Xerofluvents.

Most areas of this unit serve as watershed or are used as recreational areas or wildlife habitat. The main management concerns are a severe hazard of erosion, the slope, and a very low available water capacity.

### 13. Millsholm-Azule

*Gently sloping to moderately steep, shallow and moderately deep, well drained loam and silty clay loam that formed in material weathered from mudstone*

This unit occurs around Blanchard Flat near Reading Creek. The native vegetation is dominated by grass and hardwoods. Elevation ranges from 1,900 to 2,100 feet. The average annual precipitation is 40 to 50 inches. The average annual air temperature is about 60 degrees F. The frost-free season is about 150 days.

This unit makes up about 1 percent of the survey area. It is about 57 percent Millsholm and similar soils, 21 percent Azule and similar soils, and 22 percent components of minor extent.

The Millsholm soils are shallow. The surface layer is loam. The subsoil is loam over fractured mudstone.

The Azule soils are moderately deep. The surface layer is silty clay loam. The subsoil is clay over weakly consolidated mudstone.

Of minor extent in this unit are Atter and Jafa soils and Xerofluvents.

Most areas of this unit are used for pastureland, hayland, or homesite development, serve as watershed, or are used as recreational areas or wildlife habitat. The main limitation affecting pastureland and hayland is the shallow depth of the Millsholm soils. The main limitations affecting homesite development are the shallow depth of the Millsholm soils, restricted permeability in the Azule soils, and the slope.

# Detailed Soil Map Units

The map units delineated on the detailed maps that accompany this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to help plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Crefork clay loam, 15 to 30 percent slopes, is a phase of the Crefork series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes or associations.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Brownscreek-Dougcity complex, 50 to 75 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Cargent-Demogul association, 75 to 90 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

This survey area was mapped at two levels of detail. At the more detailed level, map units are narrowly defined. Map unit boundaries were plotted and verified at closely spaced intervals. At the less detailed level, map units are slightly more broadly defined. Boundaries were plotted and verified at wider intervals. The narrowly defined units are indicated by an asterisk in table 3. The detail of mapping was selected to meet the anticipated long-term use of the survey, and the map units were designed to meet the needs for that use.

Table 3 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

## Soil Descriptions

**101—Atter extremely gravelly loamy sand, 9 to 15 percent slopes.** This very deep, somewhat excessively drained soil is on alluvial fans and stream terraces. It is in areas adjacent to perennial streams. It formed in alluvium and outwash from hydraulic mining of mixed rock sources. The native vegetation is mainly conifers, hardwoods, and brush. Elevation is 1,400 to 1,600 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 130 to 180 days.

Typically, about 35 percent of the surface is partially covered with cobbles and gravel and with a 1-inch mat of leaves, needles, and twigs. The surface layer is light brownish gray and pale yellow extremely gravelly loamy sand about 8 inches thick. The underlying material to a depth of 60 inches or more is brownish yellow extremely gravelly loamy sand.

Included with this soil in mapping are small areas of Rock outcrop; Xerofluvents under woody streamside vegetation, such as willows and alders; Weaverville clay loam, 30 to 50 percent slopes, on hills under conifers; and Xeralfs on terraces and hills. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is rapid in the Atter soil. Available water capacity is very low. The effective rooting depth is more than 60 inches. Runoff is slow, and the hazard of water erosion is slight.

This soil is used for homesite development or timber production.

If this soil is used for homesite development, the main limitations are the very low available water capacity, large stones, small stones, and the rapid permeability. Plans for homesite development should provide for the preservation of as many trees as possible. The removal of gravel and cobbles in disturbed areas is needed for landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. If this soil is used as a site for sanitary facilities, the main limitation is the rapid permeability. If the density of housing is moderate to high, community sewage systems are needed to prevent the contamination of water supplies caused by seepage from onsite sewage disposal systems. Cutbanks in this soil are subject to caving. Providing the cutbanks with sloped banks or shoring helps to prevent caving. The design of access roads should include the control of surface runoff and the stabilization of cutslopes.

Ponderosa pine, Pacific madrone, and Douglas-fir are the main tree species. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 109 for ponderosa pine. The CACTOS 50-year site index is 70.

Few limitations affect the harvesting of timber. The very low available water capacity is the main limitation. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Careful management of reforestation is needed to reduce competition from undesirable plants and to provide partial shade for seedlings. Ponderosa pine is suitable for planting. The characteristic understory plant community is mainly greenleaf manzanita, whiteleaf manzanita, and buckbrush. Understory vegetation provides cover and forage for wildlife. Woody streamside vegetation provides important habitat for wildlife.

The land capability classification is VIIs, nonirrigated.

**102—Atter-Dumps, dredge tailings-Xerofluvents complex, 2 to 9 percent slopes.** This map unit is on alluvial fans, stream terraces, and flood plains that have been altered by dredging operations. It is in areas adjacent to perennial streams. The native vegetation on the Atter soil is mainly conifers, hardwoods, and brush.

The Dumps are mainly barren but support scattered conifers or brush. The native vegetation on the Xerofluvents is mainly riparian hardwoods, brush, and a few conifers. Elevation is 1,300 to 2,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 180 days.

This unit is about 50 percent Atter extremely gravelly loamy sand; 20 percent Dumps, dredge tailings; and 15 percent Xerofluvents. The Atter soil is on alluvial fans and stream terraces. The Dumps are scattered throughout the unit. The Xerofluvents are on stream terraces and flood plains. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Haysum gravelly loam and Carrcreek gravelly loam on stream terraces and alluvial fans; Brownbear very gravelly loam, 50 to 75 percent slopes, and Brockgulch very gravelly loam, 50 to 75 percent slopes, on mountain side slopes; Riverwash in stream channels; Weaverville clay loam; and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Atter soil is very deep and is somewhat excessively drained. It formed in alluvium and outwash from hydraulic mining of mixed rock sources. Typically, about 35 percent of the surface is partially covered with cobbles and pebbles and with a 1-inch mat of leaves, needles, and twigs. The surface layer is light brownish gray and pale yellow extremely gravelly loamy sand about 8 inches thick. The underlying material to a depth of 60 inches or more is brownish yellow extremely gravelly loamy sand.

Permeability is rapid in the Atter soil. Available water capacity is very low. The effective rooting depth is more than 60 inches. Runoff is slow, and the hazard of water erosion is slight.

Dumps, dredge tailings, consist of nearly barren mounds deposited along stream channels by dredge mining activities. These mounds are long and are 5 to 30 feet tall. The dredge tailings are mostly rounded cobbles and pebbles with some stones. Coarse textured material fills some of the areas between the rock fragments. Some areas have loam or clay loam in pockets. In a few areas this material has been smoothed out by bulldozing.

Permeability is rapid in areas of the Dumps. Runoff is medium, and the hazard of water erosion is slight.

Xerofluvents consist of well drained soils that formed in alluvium derived from mixed rock sources. Color and texture are variable. A reference pedon has a surface layer of variegated brown gravelly sand about 5 inches thick. The underlying material to a depth of 60 inches or more is variegated brown very gravelly fine sandy loam and extremely gravelly coarse sand.

Permeability is medium or rapid in the Xerofluvents. Available water capacity is very low or low. The effective rooting depth is more than 60 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate. These soils are subject to flooding during prolonged, high-intensity storms. The frequency of the flooding ranges from rare to frequent. Channeling and deposition are common along streambanks.

This unit serves mainly as watershed or is used as wildlife habitat or recreational areas. Some areas of the Atter soil are used for homesite development or timber production.

The Xerofluvents provide seasonal habitat for fish and wildlife. The present vegetation in most areas is mainly willows and alders and some ponderosa pine, Douglas-fir, manzanita, ceanothus, and grasses.

If the Atter soil is used for homesite development, the main limitations are the very low available water capacity, the rapid permeability, large stones, and small stones. Plans for homesite development should provide for the preservation of as many trees as possible. The removal of gravel and cobbles in disturbed areas is needed for landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. If this soil is used as a site for sanitary facilities, the rapid permeability is the main limitation. If the density of housing is moderate to high, community sewage systems are needed to prevent the contamination of water supplies caused by seepage from onsite sewage disposal systems. Cutbanks are subject to caving. Providing the cutbanks with sloped banks or shoring helps to prevent caving.

Ponderosa pine, Pacific madrone, and Douglas-fir are the main tree species on the Atter soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 109 for ponderosa pine. The CACTOS 50-year site index is 70.

Few limitations affect the harvesting of timber. The very low available water capacity of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Careful management of reforestation is needed to reduce competition from undesirable plants and to provide partial shade for seedlings. Ponderosa pine is suitable for planting. The characteristic understory plant community on the Atter soil is mainly greenleaf manzanita, whiteleaf manzanita, and buckbrush. The understory vegetation provides cover and forage for wildlife.

The land capability classification of the Atter soil and the Xerofluvents is VIIs, nonirrigated, and that of the Dumps is VIII.

**103—Bamtush-Brownbear complex, 15 to 30 percent slopes.** This map unit is on mountains. The native vegetation is mainly mixed conifers, hardwoods, and brush. Elevation is 2,500 to 3,100 feet. The average annual precipitation is 40 to 55 inches. The average annual air temperature is 50 to 57 degrees F in areas of the Bamtush soil and 52 to 57 degrees in areas of the Brownbear soil. The average frost-free period is 90 to 130 days.

This unit is 55 percent Bamtush extremely gravelly loam and 25 percent Brownbear very gravelly loam. The Brownbear soil is mainly on south-facing slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Hoosimbim extremely gravelly sandy loam, areas of Indleton extremely gravelly sandy loam, areas that have slopes of more than 30 percent, and areas of gravelly clay soils that are more than 60 inches deep over bedrock. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Bamtush soil is very deep and is well drained. It formed in colluvium and material weathered from sedimentary rocks. Typically, about 30 percent of the surface is partially covered with gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is dark grayish brown and brown extremely gravelly loam about 6 inches thick. The upper 8 inches of the subsoil is yellowish brown very gravelly loam. The lower 53 inches is brown and reddish yellow very gravelly sandy clay loam.

Permeability is moderate in the Bamtush soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is moderate.

The Brownbear soil is moderately deep and is well drained. It formed in colluvium and residuum derived dominantly from sedimentary rocks. Typically, about 30 percent of the surface is partially covered with gravel and with a 1-inch mat of needles, leaves, and twigs mixed with gravel. The surface layer is brown very gravelly loam about 4 inches thick. The upper 5 inches of the subsoil is light brown very gravelly loam. The lower 13 inches of the subsoil is light brown gravelly clay loam and light brown very gravelly clay loam. The substratum is brownish yellow extremely gravelly clay loam about 10 inches thick. Fractured schist is at a depth of about 32 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Brownbear soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used for timber production.

Douglas-fir, ponderosa pine, California black oak, sugar pine, and Pacific madrone are the main tree species on the Bamtush soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 123 for Douglas-fir on the Bamtush soil. The CACTOS 50-year site index for the Bamtush soil is 73.

Douglas-fir, sugar pine, canyon live oak, Pacific madrone, and ponderosa pine are the main tree species on the Brownbear soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 94 for Douglas-fir on the Brownbear soil. The CACTOS 50-year site index for the Brownbear soil is 59.

The main concerns affecting the production and harvesting of timber are the moderate hazard of erosion and the low available water capacity. Conventional methods of harvesting timber can be used. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Trees that are suitable for planting include ponderosa pine on the Brownbear soil and Douglas-fir and ponderosa pine on the Bamtush soil. The characteristic understory plant community on the Bamtush soil is mainly deerbrush, snowberry, California hazel, Pacific madrone, and poison-oak. The characteristic understory plant community on the Brownbear soil is mainly greenleaf manzanita and poison-oak. Understory vegetation provides cover and forage for wildlife.

The land capability classification is IVe-1, nonirrigated.

**104—Bamtush-Brownbear complex, 50 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly conifers, hardwoods, and brush. Elevation is 1,750 to 4,400 feet. The average annual precipitation is 40 to 55 inches. The average annual air temperature is 45 to 57 degrees F in areas of the Bamtush soil and 52 to 57 degrees F in areas of the Brownbear soil. The average frost-free period is 90 to 130 days.

This unit is about 40 percent Bamtush extremely gravelly loam and 40 percent Brownbear very gravelly loam. The Brownbear soil is mainly on south-facing slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Weaverville loam, 30 to 50 percent slopes, on old landslides; Goulding very gravelly loam under scattered oaks; Brockgulch very gravelly loam under canyon live oaks; and a deep, clayey soil in gently sloping areas under open stands of Oregon white oak and grass. Also included are small areas of slips and small landslides on Oregon Mountain. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Bamtush soil is very deep and is well drained. It formed in residuum and colluvium derived from metavolcanic rocks and some metasedimentary rocks. Typically, about 30 percent of the surface is partially covered with gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is dark grayish brown and brown extremely gravelly loam about 6 inches thick. The upper 8 inches of the subsoil is yellowish brown very gravelly loam. The lower 53 inches is brown and reddish yellow very gravelly sandy clay loam.

Permeability is moderate in the Bamtush soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe.

The Brownbear soil is moderately deep and is well drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, about 30 percent of the surface is partially covered with gravel and with a 1-inch mat of needles, leaves, and twigs. The surface layer is brown very gravelly loam about 4 inches thick. The upper 5 inches of the subsoil is light brown very gravelly loam. The lower 13 inches of the subsoil is light brown gravelly clay loam and light brown very gravelly clay loam. The substratum is brownish yellow extremely gravelly clay loam about 10 inches thick. Fractured schist is at a depth of about 32 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Brownbear soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Some roots penetrate to a greater depth by following fractures in the bedrock. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used for timber production.

Douglas-fir, ponderosa pine, California black oak, sugar pine, and Pacific madrone are the main tree species on the Bamtush soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 123 for Douglas-fir on the Bamtush soil. The CACTOS 50-year site index for the Bamtush soil is 73.

Douglas-fir, sugar pine, canyon live oak, Pacific madrone, and ponderosa pine are the main tree species on the Brownbear soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 94 for Douglas-fir on the Brownbear soil. The CACTOS 50-year site index for the Brownbear soil is 59.

The main concerns affecting the production and harvesting of timber are the severe hazard of erosion, the slope, and the low available water capacity. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Management practices that help to overcome seedling mortality on the Brownbear soil generally are not economically feasible. Trees that are suitable for planting include ponderosa pine on the Brownbear soil and Douglas-fir and ponderosa pine on the Bamtush soil. The characteristic understory plant community on the Bamtush soil is mainly deerbrush, snowberry, California hazel, Pacific madrone, and poison-oak. The characteristic understory plant community on the Brownbear soil is mainly greenleaf manzanita and poison-oak. Understory vegetation provides cover and forage for wildlife.

The land capability classification is VIIe, nonirrigated.

**105—Bamtush-Brownbear-Weaverville complex, 30 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly conifers, hardwoods, and brush. Elevation is 2,300 to 3,900 feet. The average annual precipitation is 40 to 50 inches. The average annual air temperature is 45 to 57 degrees F in areas of the Bamtush and Weaverville soils and 52 to 57 degrees F in areas of the Brownbear soil. The average frost-free period is 90 to 130 days.

This unit is about 40 percent Bamtush extremely gravelly loam, 25 percent Brownbear very gravelly loam, and 20 percent Weaverville loam. The Bamtush and Brownbear soils are on mountains and have slopes of 50 to 75 percent. The Brownbear soil is mostly on south-facing slopes. The Weaverville soil is on old landslides and has slopes of 30 to 50 percent. Slopes are convex on the Bamtush and Brownbear soils and

slightly concave on the Weaverville soil. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Goulding very gravelly loam; Bamtush soils that have slopes of less than 50 percent; Weaverville soils that have slopes of less than 30 percent; areas of very deep, very gravelly clay soils on mountains under conifers; deep, clayey soils in gently sloping areas under open stands of Oregon white oak and grass; and Xeralfs and Xerorthents in areas that have been hydraulically mined. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Bamtush soil is very deep and is well drained. It formed in residuum and colluvium derived from metavolcanic rocks and some metasedimentary rocks. Typically, about 30 percent of the surface is partially covered with gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is dark grayish brown and brown extremely gravelly loam about 6 inches thick. The upper 8 inches of the subsoil is yellowish brown very gravelly loam. The lower 53 inches is brown and reddish yellow very gravelly sandy clay loam.

Permeability is moderate in the Bamtush soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe.

The Brownbear soil is moderately deep and is well drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, about 30 percent of the surface is partially covered with gravel and with a 1-inch mat of needles, leaves, and twigs mixed with gravel. The surface layer is brown very gravelly loam about 4 inches thick. The upper 5 inches of the subsoil is light brown very gravelly loam. The lower 13 inches of the subsoil is light brown gravelly clay loam and light brown very gravelly clay loam. The substratum is brownish yellow extremely gravelly clay loam about 10 inches thick. Fractured schist is at a depth of about 32 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Brownbear soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Some roots penetrate to a greater depth by following fractures in the bedrock. Runoff is very rapid, and the hazard of water erosion is severe.

The Weaverville soil is very deep and is well drained. It formed in material derived dominantly from weakly consolidated, moderately fine grained sediments and in colluvium. Typically, 10 to 15 percent of the surface is partially covered with gravel and cobbles and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is reddish brown loam about 4 inches thick. The upper 52 inches of the subsoil is yellowish red gravelly loam over yellowish red and red gravelly clay loam. The lower part of the subsoil to a depth of 81 inches or more is red very gravelly clay loam.

Permeability is moderately slow in the Weaverville soil. Available water capacity is high or very high. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for timber production.

Douglas-fir, ponderosa pine, California black oak, sugar pine, and Pacific madrone are the main tree species on the Bamtush soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 123 for Douglas-fir on the Bamtush soil. The CACTOS 50-year site index for the Bamtush soil is 73.

Douglas-fir, sugar pine, canyon live oak, Pacific madrone, and ponderosa pine are the main tree species on the Brownbear soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 94 for Douglas-fir on the Brownbear soil. The CACTOS 50-year site index for the Brownbear soil is 59.

Douglas-fir, sugar pine, California black oak, and ponderosa pine are the main tree species on the Weaverville soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 107 for Douglas-fir on the Weaverville soil. The CACTOS 50-year site index for the Weaverville soil is 72.

The main concerns affecting the production and harvesting of timber are the severe hazard of erosion, the slope, and the low available water capacity of the Bamtush and Brownbear soils. Also, mass movement is a management concern on the Weaverville soil. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The droughtiness of the surface layer in the Bamtush and Brownbear soils reduces the seedling survival rate, especially on south- and west-facing slopes. Management practices that help to overcome seedling mortality on the Brownbear

soil generally are not economically feasible. Unsurfaced roads and skid trails on the Weaverville soil are soft and slippery when wet, and they may be impassable during rainy periods. This condition limits the use of equipment to dry periods. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, can damage the roots of trees, and may reduce the growth or regeneration of seedlings planted later. Because the Weaverville soil has the potential for mass movement, roads and landings should be carefully located so that deep cuts and fills are avoided. Trees that are suitable for planting include ponderosa pine on the Brownbear soil and Douglas-fir and ponderosa pine on the Bamtush and Weaverville soils. The characteristic understory plant community on the Bamtush and Weaverville soils is mainly deerbrush, snowberry, California hazel, Pacific madrone, and poison-oak. The characteristic understory plant community on the Brownbear soil is mainly greenleaf manzanita and poison-oak. Understory vegetation provides cover and forage for wildlife.

The land capability classification is VIIe, nonirrigated.

**106—Bamtush-Weaverville complex, 15 to 30 percent slopes.** The native vegetation on this unit is mainly conifers, hardwoods, and brush. Elevation is 3,000 to 3,700 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 45 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 50 percent Bamtush extremely gravelly loam and 30 percent Weaverville loam. The Bamtush soil is on mountain slopes, and the Weaverville soil is on old landslides. Slopes are convex on the Bamtush soil and slightly concave on the Weaverville soil. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Bamtush and Weaverville soils that have slopes of more than 30 percent; Brownbear very gravelly loam, 30 to 50 percent slopes; areas of a very deep, very gravelly clay soil on mountains under conifers; areas of a very deep, poorly drained, clay soil in meadows under marsh vegetation, such as reeds and cattails; and Xeralfs-Xerorthents complex and barren eroded areas resulting from hydraulic mining. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Bamtush soil is very deep and is well drained. It formed in residuum and colluvium derived from metavolcanic rocks and some metasedimentary rocks. Typically, 30 percent of the surface is partially covered with gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is dark grayish brown and brown extremely gravelly loam about 6 inches thick. The upper 8 inches of the subsoil is yellowish brown very gravelly loam. The lower 53 inches is brown and reddish yellow very gravelly sandy clay loam.

Permeability is moderate in the Bamtush soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is moderate.

The Weaverville soil is very deep and is well drained. It formed in material weathered from weakly consolidated, moderately fine grained sediments and in colluvium. Typically, 10 to 15 percent of the surface is partially covered with gravel and cobbles and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is reddish brown loam about 4 inches thick. The upper 52 inches of the subsoil is yellowish red gravelly loam over yellowish red and red gravelly clay loam. The lower part of the subsoil to a depth of 81 inches or more is red very gravelly clay loam.

Permeability is moderately slow in the Weaverville soil. Available water capacity is high or very high. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used for timber production.

Douglas-fir, ponderosa pine, California black oak, sugar pine, and Pacific madrone are the main tree species on the Bamtush soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 123 for Douglas-fir on the Bamtush soil. The CACTOS 50-year site index for the Bamtush soil is 73.

Douglas-fir, sugar pine, California black oak, and ponderosa pine are the main tree species on the Weaverville soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 107 for Douglas-fir on the Weaverville soil. The CACTOS 50-year site index for the Weaverville soil is 72.

The main concern affecting the production and harvesting of timber is the moderate hazard of erosion. The low available water capacity is an additional concern in areas of the Bamtush soil. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion. Unsurfaced roads and skid trails are soft and slippery when wet, and they may be impassable during rainy periods. This condition limits the use of equipment to dry periods. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, can damage the roots of trees, and may reduce the growth or regeneration of seedlings planted later. The careful management of reforestation is needed after harvesting to reduce

competition from undesirable understory plants. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The low available water capacity of the Bamtush soil reduces the seedling survival rate. Trees that are suitable for planting include Douglas-fir, sugar pine, and ponderosa pine. The characteristic understory plant community is mainly deerbrush, snowberry, California hazel, Pacific madrone, and poison-oak. Understory vegetation provides cover and forage for wildlife.

The land capability classification is IVe, nonirrigated.

**107—Bamtush-Weaverville-Brownbear complex, 15 to 50 percent slopes.** The native vegetation on this unit is mainly conifers, hardwoods, and brush. Elevation is 2,800 to 3,900 feet. The average annual precipitation is 40 to 50 inches, and the average frost-free period is 90 to 130 days. The average annual air temperature in areas of the Bamtush and Weaverville soils is 45 to 57 degrees F. The average annual air temperature in areas of the Brownbear soil is 52 to 57 degrees F.

This unit is 40 percent Bamtush extremely gravelly loam, 25 percent Weaverville loam, and 15 percent Brownbear very gravelly loam. The Bamtush and Brownbear soils are on mountain slopes. The Brownbear soil is on south-facing slopes. The Weaverville soil is on old landslides. Slopes are convex on the Bamtush and Brownbear soils and range from 30 to 50 percent. They are slightly concave on the Weaverville soil and range from 15 to 30 percent. The Bamtush, Weaverville, and Brownbear soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of a very deep, very gravelly clay soil on mountains; Goulding very gravelly loam, 50 to 75 percent slopes; areas of Bamtush, Weaverville, and Brownbear soils that have slopes of more than 50 percent or less than 15 percent; areas of a deep, clayey soil in gently sloping areas under open stands of Oregon white oak and grass; and areas of a very deep, poorly drained, clay soil in meadows under marsh vegetation, such as reeds and cattails. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Bamtush soil is very deep and is well drained. It formed in residuum and colluvium derived from metavolcanic rocks and some metasedimentary rocks. Typically, 30 percent of the surface is partially covered with gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is dark grayish brown and brown extremely gravelly loam about 6 inches thick. The upper 8 inches of the subsoil is yellowish brown very gravelly loam. The lower 53 inches is brown and reddish yellow very gravelly sandy clay loam.

Permeability is moderate in the Bamtush soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is moderate.

The Weaverville soil is very deep and is well drained. It formed in material weathered from weakly consolidated, moderately fine grained sediments and colluvium. Typically, 10 to 15 percent of the surface is partially covered with gravel and cobbles and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is reddish brown loam about 4 inches thick. The upper 52 inches of the subsoil is yellowish red gravelly loam over yellowish red and red gravelly clay loam. The lower part of the subsoil to a depth of 81 inches or more is red very gravelly clay loam.

Permeability is moderately slow in the Weaverville soil. Available water capacity is high or very high. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is moderate.

The Brownbear soil is moderately deep and is well drained. It formed in residuum and colluvium derived from metavolcanic rock. Typically, 30 percent of the surface is partially covered with gravel and with a 1-inch mat of needles, leaves, and twigs. The surface layer is brown very gravelly loam about 4 inches thick. The upper 5 inches of the subsoil is light brown very gravelly loam. The lower 13 inches of the subsoil is light brown gravelly clay loam and light brown very gravelly clay loam. The substratum is brownish yellow extremely gravelly clay loam about 10 inches thick. Fractured schist is at a depth of about 32 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Brownbear soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. In places roots may penetrate to a greater depth by following fractures in the bedrock. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used for timber production.

Douglas-fir, ponderosa pine, California black oak, sugar pine, and Pacific madrone are the main tree species on the Bamtush soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 123 for Douglas-fir on the Bamtush soil. The CACTOS 50-year site index for the Bamtush soil is 73.

Douglas-fir, sugar pine, California black oak, and ponderosa pine are the main tree species on the Weaverville soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 107 for Douglas-fir on the Weaverville soil. The CACTOS

50-year site index for the Weaverville soil is 72.

Douglas-fir, sugar pine, canyon live oak, Pacific madrone, and ponderosa pine are the main tree species on the Brownbear soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 94 for Douglas-fir on the Brownbear soil. The CACTOS 50-year site index for the Brownbear soil is 59.

The main concern affecting the production and harvesting of timber is the moderate hazard of erosion. The slope and the low available water capacity also are concerns in areas of the Bamtush and Brownbear soils. The slope limits the kinds of equipment that can be used. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion. Roads and landings can be protected against erosion by constructing water bars. Unsurfaced roads and skid trails on the Weaverville soil are soft and slippery when wet, and they may be impassable during rainy periods. This condition limits the use of equipment to dry periods. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, can damage the roots of trees, and may reduce the growth or regeneration of seedlings planted later. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. If the site is not adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Management practices that help to overcome seedling mortality on the Brownbear soil generally are not economically feasible. Trees that are suitable for planting include ponderosa pine on the Brownbear soil and Douglas-fir and ponderosa pine on the Bamtush and Weaverville soils. The characteristic understory plant community on the Bamtush and Weaverville soils is mainly deerbrush, snowberry, California hazel, Pacific madrone, and poison-oak. The characteristic understory plant community on the Brownbear soil is mainly greenleaf manzanita and poison-oak. Understory vegetation provides cover and forage for wildlife.

The land capability classification is VIe, nonirrigated.

**109—Barpeak-Sheetiron complex, 50 to 90 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly mixed conifers. Elevation is 2,400 to 5,400 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is 47 to 50 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 60 percent Barpeak very gravelly loam and 20 percent Sheetiron very gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Brownscreek gravelly loam, Dougcity gravelly loam, Beargulch very gravelly loam, and Skyrock extremely gravelly loam. Also included are small areas of shallow, very gravelly loam soils; areas of deep, very gravelly clay loam soils that have a thick, dark surface layer; areas of moderately deep, very gravelly loam soils that are underlain by soft material derived from mica schist; and areas of Xerofluvents and Riverwash along stream channels under woody streamside vegetation. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Barpeak soil is very deep and is well drained. It formed in colluvium derived from mica schist. Typically, 25 percent of the surface is partially covered with gravel and with a 2-inch mat of needles, leaves, twigs, cones, and branches. The surface layer is yellowish brown very gravelly loam about 3 inches thick. The upper 5 inches of the subsoil is brown very gravelly sandy loam. The lower part of the subsoil and the substratum to a depth of 60 inches is light yellowish brown and brown extremely gravelly sandy loam and pink extremely gravelly sandy clay loam.

Permeability is moderate in the Barpeak soil. Available water capacity is very low or low. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is very severe.

The Sheetiron soil is moderately deep and is well drained. It formed in colluvium and material weathered from mica schist. Typically, 45 percent of the surface is partially covered with gravel, with a few cobbles and stones, and with a 2-inch mat of needles, leaves, twigs, cones, and branches. The surface layer is yellowish brown very gravelly loam about 4 inches thick. The subsoil is yellowish brown very gravelly loam about 15 inches thick. The substratum is light yellowish brown extremely gravelly loam about 5 inches thick. Fractured mica schist is at a depth of about 24 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Sheetiron soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is very severe.

This unit is used for timber production.

Douglas-fir, sugar pine, ponderosa pine, canyon live

oak, and California black oak are the main tree species on the Barpeak soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 116 for Douglas-fir on the Barpeak soil. The CACTOS 50-year site index for the Barpeak soil is 73.

Ponderosa pine, sugar pine, Douglas-fir, canyon live oak, and California black oak are the main tree species on the Sheetiron soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 104 for ponderosa pine on the Sheetiron soil. The CACTOS 50-year site index for the Sheetiron soil is 60.

The main concerns affecting the production and harvesting of timber are the slope, the very severe hazard of erosion, and the very low or low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. A crust is likely to form on the surface of these soils after they are disturbed. This crust reduces the rate of water infiltration and increases surface runoff. It can also increase the hazard of erosion. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars and by seeding fills. Soils on steep slopes adjacent to drainageways are susceptible to mass movement. Disturbance of the soils should be minimized in these areas. Careful management of reforestation is needed to reduce competition from undesirable plants and to provide partial shade for seedlings. The low available water capacity of the Barpeak soil reduces the seedling survival rate. The very low available water capacity, the pebbles on the surface, and the slope reduce the seedling survival rate in areas of the Sheetiron soil. Trees that are suitable for planting include Douglas-fir, ponderosa pine, and sugar pine. The characteristic understory plant community on the Barpeak soil is mainly shrub live oak, deervetch, shrub tanoak, lupine, and brackenfern. The characteristic understory plant community on the Sheetiron soil is mainly deervetch, lupine, shrub tanoak, and shrub live oak. The understory plant community provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIIe, nonirrigated.

**110—Beargulch-Skyrock complex, 50 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly conifers and brush on the Beargulch soil and brush on the Skyrock soil. Elevation is 3,900 to 5,800 feet. The average annual precipitation is 60 to 75 inches, the average annual air temperature is 43 to 45 degrees F, and the average frost-free period is 70 to 90 days.

This unit is 45 percent Beargulch very gravelly loam and 35 percent Skyrock extremely gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of a moderately deep, very gravelly loam soil; Sheetiron very gravelly loam; Barpeak very gravelly loam; and Xerofluvents along stream terraces under woody streamside vegetation, such as willow and alder. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Beargulch soil is deep and well drained. It formed in colluvium derived from mica schist. Typically, 40 percent of the surface is partially covered with gravel and with a 1-inch mat of needles, twigs, branches, and cones. The surface layer is yellowish brown and light yellowish brown very gravelly loam about 12 inches thick. The subsoil is very pale brown extremely gravelly sandy loam about 31 inches thick. Fractured mica schist is at a depth of about 43 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderate in the Beargulch soil. Available water capacity is very low. The effective rooting depth is 40 to 60 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Skyrock soil is shallow and somewhat excessively drained. It formed in colluvium and residuum derived dominantly from mica schist. Typically, 80 percent of the surface is partially covered with gravel mixed with leaves. The surface layer is light yellowish brown extremely gravelly loam about 4 inches thick. The upper 6 inches of the subsoil is light yellowish brown very gravelly loam. The lower 8 inches is light yellowish brown and yellow extremely gravelly sandy clay loam. Fractured mica schist is at a depth of about 18 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Skyrock soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Beargulch soil is used for timber production, and the Skyrock soil is used as watershed, recreational areas, or wildlife habitat.

Douglas-fir and white fir are the main tree species on the Beargulch soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 127 for Douglas-fir. On the basis of a 50-year site curve (Schumacher, 1926), the mean site index is 68

for white fir on the Beargulch soil. The CACTOS 50-year site index for the Beargulch soil is 78.

The main concerns affecting the production and harvesting of timber on the Beargulch soil are the slope, the severe hazard of erosion, the very low available water capacity, and the gravel on the surface. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Careful management of reforestation is needed to reduce competition from undesirable plants and to provide partial shade for seedlings. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Loose surface material may move down the slope and reduce the seedling survival rate. Trees that are suitable for planting include Douglas-fir and white fir. California red fir is also suitable at elevations above 5,500 feet. The characteristic understory plant community on the Beargulch soil is mainly shrub tanoak, shrub live oak, snowberry, and native rose. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

Careful management is needed in watershed areas to keep surface erosion at a minimum and to maintain the quality of runoff. Because the Skyrock soil is subject to severe erosion, disturbance of the soil should be kept to a minimum. The potential plant community on the Skyrock soil is mainly shrub tanoak, canyon live oak, and whitethorn ceanothus. This vegetation provides cover and forage for wildlife. The natural vegetation is mainly brush.

The land capability classification is VIIe, nonirrigated.

**111—Brockgulch-Dedrick-Brownbear complex, 50 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation on the Brockgulch soil is mainly hardwoods and brush with some conifers. The native vegetation on the Dedrick soil is grass and brush and scattered hardwoods and conifers. The native vegetation on the Brownbear soil is conifers, hardwoods, and brush. Elevation is 1,500 to 4,000 feet. The average annual precipitation is 40 to 55 inches, and the average frost-free period is 90 to 130 days. The average annual air temperature in areas of the Brockgulch and Dedrick soils is 57 to 63 degrees F. The average annual air temperature in areas of the Brownbear soil is 52 to 57 degrees F.

This unit is 35 percent Brockgulch very gravelly loam, 25 percent Dedrick very gravelly loam, and 15 percent Brownbear very gravelly loam. The Brockgulch soil is mostly on exposed south-facing slopes, the Dedrick soil is mostly on exposed spur ridgetops, and the Brownbear soil is mostly on slightly sheltered southeast-facing slopes. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Rock outcrop; Pardaloe very gravelly loam under Douglas-fir on sheltered aspects; Weaverville loam, 30 to 50 percent slopes, on ridgetops or old landslides under Douglas-fir and ponderosa pine; and Xerofluvents along drainageways under woody streamside vegetation, such as willows and alders. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Brockgulch soil is moderately deep and is well drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, 60 percent of the surface is partially covered with gravel and a few cobbles. The surface layer is brown very gravelly loam about 3 inches thick. The subsoil is brown and strong brown very gravelly loam about 13 inches thick. The substratum is strong brown extremely gravelly loam about 8 inches thick. Fractured schist bedrock is at a depth of about 24 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Brockgulch soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Dedrick soil is shallow and somewhat excessively drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, 60 percent of the surface is partially covered with gravel and 10 percent is partially covered with cobbles. The surface layer is dark yellowish brown very gravelly loam about 3 inches thick. The subsoil is yellowish brown extremely gravelly loam about 12 inches thick. Fractured schist is at a depth of 15 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Dedrick soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Brownbear soil is moderately deep and is well drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, 30 percent of the surface is partially covered with gravel and with a 1-inch mat of needles, leaves, and twigs. The surface layer is brown very gravelly loam about 4 inches thick. The upper 5 inches of the subsoil is light brown very

gravelly loam. The lower 13 inches of the subsoil is light brown gravelly clay loam and light brown very gravelly clay loam. The substratum is brownish yellow extremely gravelly clay loam about 10 inches thick. Fractured schist is at a depth of about 32 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Brownbear soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. In some areas roots may penetrate to a greater depth by following fractures in the bedrock. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used mainly as watershed, recreational areas, or wildlife habitat. It also is used for wood products. The Brownbear soil is used for timber production.

Careful management is needed in watershed areas and in areas used as recreational areas or wildlife habitat to keep surface erosion to a minimum and to maintain the quality of the runoff. The main concerns affecting the production of wood products are the hazard of erosion and the slope. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope restricts the use of equipment.

Canyon live oak and digger pine are the main tree species on the Brockgulch soil. This soil can produce 52 cords of wood per acre from a stand of trees that average 8 inches in diameter at a height of 4.5 feet. The characteristic understory plant community on the Brockgulch soil is mainly cheatgrass, wild oats, silver hairgrass, and poison-oak. Understory vegetation provides cover and forage for wildlife.

Most areas of the Dedrick soil support less than 10 percent tree canopy. The potential plant community is mainly buckbrush, birchleaf mountainmahogany, grasses, and scattered canyon live oak and digger pine. This vegetation provides food and cover for wildlife. The natural vegetation is mainly brush. In areas where the Dedrick soil supports a canopy of trees, canyon live oak and digger pine are the main species. This soil can produce 24 cords of wood per acre from a stand of trees that average 10 inches in diameter at a height of 4.5 feet.

Douglas-fir, sugar pine, canyon live oak, Pacific madrone, and ponderosa pine are the main tree species on the Brownbear soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 94 for Douglas-fir. The CACTOS 50-year site index for the Brownbear soil is 59.

The main concerns affecting the production and harvesting of timber on the Brownbear soil are the severe hazard of erosion, the slope, and the low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Loose surface fragments may move down the slope and reduce the seedling survival rate. The droughtiness of the surface layer also reduces the seedling survival rate, especially on south- and west-facing slopes. Careful management of reforestation is needed to reduce competition from undesirable plants and to provide partial shade for seedlings. Ponderosa pine is suitable for planting. Management practices that help to overcome seedling mortality generally are not economically feasible. The characteristic understory plant community on the Brownbear soil is mainly greenleaf manzanita and poison-oak. Understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIIe, nonirrigated.

In an area north of Helena, this map unit is adjacent to the soil survey of the Shasta-Trinity National Forest area. The delineations of this unit do not match those on the maps of the adjacent soil survey.

**112—Brownbear-Bamtush complex, 30 to 50 percent slopes.** This map unit is on mountains. The native vegetation is mainly mixed conifers, hardwoods, and brush. Elevation is 1,400 to 4,900 feet. The average annual precipitation is 40 to 55 inches, and the average frost-free period is 90 to 130 days. The average annual air temperature is 50 to 57 degrees F in areas of the Bamtush soil and 52 to 57 degrees F in areas of the Brownbear soil.

This unit is 50 percent Brownbear very gravelly loam and 30 percent Bamtush extremely gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Hoosimbim extremely gravelly sandy loam, Indleton extremely gravelly sandy loam, Hotaw loam, areas that have slopes of more than 50 percent, and areas of gravelly clay soils that are more than 60 inches deep over bedrock. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Brownbear soil is moderately deep and is well drained. It formed in colluvium and residuum derived dominantly from sedimentary rocks. Typically, 30 percent of the surface is partially covered with gravel and with a 1-inch mat of needles, leaves, and twigs mixed with gravel. The surface layer is brown very

gravelly loam about 4 inches thick. The upper 5 inches of the subsoil is light brown very gravelly loam. The lower 13 inches of the subsoil is light brown gravelly clay loam and light brown very gravelly clay loam. The substratum is brownish yellow extremely gravelly clay loam about 10 inches thick. Fractured schist is at a depth of about 32 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Brownbear soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Bamtush soil is very deep and is well drained. It formed in colluvium and material weathered from sedimentary rocks. Typically, 30 percent of the surface is partially covered with gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is dark grayish brown and brown extremely gravelly loam about 6 inches thick. The upper 8 inches of the subsoil is yellowish brown very gravelly loam. The lower 53 inches is brown and reddish yellow very gravelly sandy clay loam.

Permeability is moderate in the Bamtush soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used mainly for timber production. A few areas are used as homesites.

Douglas-fir, sugar pine, canyon live oak, Pacific madrone, and ponderosa pine are the main tree species on the Brownbear soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 94 for Douglas-fir on the Brownbear soil. The CACTOS 50-year site index for the Brownbear soil is 59.

Douglas-fir, ponderosa pine, California black oak, sugar pine, and Pacific madrone are the main tree species on the Bamtush soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 123 for Douglas-fir on the Bamtush soil. The site index for Douglas-fir ranges from 112 to 138. The CACTOS 50-year site index for the Bamtush soil is 73.

The main concerns affecting the production and harvesting of timber are the slope, the moderate hazard of erosion, and the low available water capacity. The slope limits the kinds of equipment that can be used. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Careful management of reforestation is needed to reduce competition from undesirable understory plants. If the site is not adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Trees that are suitable for planting include ponderosa pine on the Brownbear soil and Douglas-fir and ponderosa pine on the Bamtush soil. The characteristic understory plant community on the Bamtush soil is mainly deerbrush, snowberry, California hazel, Pacific madrone, and poison-oak. The characteristic understory plant community on the Brownbear soil is mainly greenleaf manzanita and poison-oak. The understory vegetation provides cover and forage for wildlife.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cut areas are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. The installation and functioning of septic tank absorption fields are severely limited by the slope.

The land capability classification is VIe, nonirrigated.

**113—Brownscreek gravelly loam, 30 to 50 percent slopes.** This moderately deep, well drained soil is on mountains. It formed in residuum and colluvium derived from mica schist. The native vegetation is mainly mixed conifers, hardwoods, and brush. Elevation is 1,800 to 2,500 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 35 to 40 percent of the surface is partially covered with gravel and some cobbles and with a 1-inch mat of leaves and needles. The surface layer is strong brown gravelly loam about 6 inches thick. The upper 18 inches of the subsoil is reddish yellow very gravelly loam and very gravelly clay loam. The lower 10 inches is reddish yellow extremely gravelly loam. Extremely fractured mica schist is at a depth of about 34 inches. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Dougcity gravelly loam and Sheetiron very gravelly loam under conifers and Dedrick very gravelly loam under grass and hardwoods. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Brownscreek soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This soil is used for timber production.

Ponderosa pine, Pacific madrone, California black

oak, canyon live oak, and Douglas-fir are the main tree species. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 104 for ponderosa pine. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 119 for Douglas-fir. The CACTOS 50-year site index is 71.

The main concerns affecting the production and harvesting of timber are the slope, the severe hazard of erosion, and the low available water capacity. The slope limits the kinds of equipment that can be used. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Careful management of reforestation is needed to reduce competition from undesirable understory plants. The low available water capacity reduces the seedling survival rate. Ponderosa pine is suitable for planting. The characteristic understory plant community is mainly poison-oak, shrub live oak, and greenleaf manzanita. The understory vegetation provides cover and forage for wildlife.

The slope is a major concern if this soil is used for homesite development. Extensive cutting and filling generally are required. The cut areas are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. The installation and functioning of septic tank absorption fields are severely limited by the slope and the moderate depth to bedrock.

The land capability classification is VIe, nonirrigated.

**114—Brownscreek gravelly loam, 50 to 75 percent slopes.** This moderately deep, well drained soil is on mountains. It formed in residuum and colluvium derived from mica schist. The native vegetation is mainly mixed conifers, hardwoods, and brush. Elevation is 1,650 to 3,700 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 35 to 40 percent of the surface is partially covered with gravel and some cobbles and with a 1-inch mat of leaves and needles mixed with gravel. The surface layer is strong brown gravelly loam about 6 inches thick. The upper 18 inches of the subsoil is reddish yellow very gravelly loam and very gravelly clay loam. The lower 10 inches is reddish yellow extremely gravelly loam. Extremely fractured mica schist is at a depth of about 34 inches. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Dedrick very gravelly loam under grass and hardwoods and areas of Dougcity gravelly loam and Sheetiron very gravelly loam under conifers. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Brownscreek soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This soil is used for timber production.

Ponderosa pine, Pacific madrone, California black oak, canyon live oak, and Douglas-fir are the main tree species. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 104 for ponderosa pine. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 119 for Douglas-fir. The CACTOS 50-year site index is 71.

The main concerns affecting the production and harvesting of timber are the slope, the severe hazard of erosion, and the low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Careful management of reforestation is needed to reduce competition from undesirable understory plants. The low available water capacity reduces the seedling survival rate. Ponderosa pine is suitable for planting. The characteristic understory plant community is mainly poison-oak, shrub live oak, and greenleaf manzanita. The understory vegetation provides cover and forage for wildlife.

The land capability classification is VIIe, nonirrigated.

**115—Brownscreek-Dedrick complex, 50 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly conifers, hardwoods, and brush on the Brownscreek soil and grass, hardwoods, and brush on the Dedrick soil. Elevation is 1,650 to 3,000 feet. The average annual precipitation is 40 to 50 inches, and the average frost-free period is 90 to 130 days. The average annual air temperature is 50 to 57 degrees F in areas of the Brownscreek soil and 57 to 63 degrees F in areas of the Dedrick soil.

This unit is 50 percent Brownscreek gravelly loam and 30 percent Dedrick very gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Dougcity gravelly loam, Sheetiron very gravelly loam,

and Sheetiron Variant gravelly loam under conifers on slopes of 50 to 75 percent and areas of Xerofluvents along stream channels under woody streamside vegetation, such as willow and alder. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Brownscreek soil is moderately deep and is well drained. It formed in residuum and colluvium derived from mica schist. Typically, 35 to 40 percent of the surface is partially covered with gravel and some cobbles and with a 1-inch mat of leaves and needles. The surface layer is strong brown gravelly loam about 6 inches thick. The upper 18 inches of the subsoil is reddish yellow very gravelly loam and very gravelly clay loam. The lower 10 inches is reddish yellow extremely gravelly loam. Extremely fractured mica schist is at a depth of about 34 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Brownscreek soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Dedrick soil is shallow and somewhat excessively drained. It formed in residuum and colluvium derived from mica schist. Typically, 60 percent of the surface is partially covered with gravel and 10 percent is partially covered with cobbles. The surface layer is dark yellowish brown very gravelly loam about 3 inches thick. The subsoil is yellowish brown extremely gravelly loam about 12 inches thick. Fractured schist is at a depth of about 15 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Dedrick soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Brownbear soil is used mainly for timber production. The Dedrick soil is used as watershed.

Ponderosa pine, Pacific madrone, California black oak, canyon live oak, and Douglas-fir are the main tree species on the Brownscreek soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 104 for ponderosa pine on the Brownscreek soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 119 for Douglas-fir. The CACTOS 50-year site index for the Brownscreek soil is 71.

The main concerns affecting the production and harvesting of timber on the Brownscreek soil are the slope, the severe hazard of erosion, and the low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Careful management of reforestation is needed to reduce competition from undesirable plants and to provide partial shade for seedlings. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Ponderosa pine is suitable for planting. The characteristic understory plant community on the Brownscreek soil is mainly poison-oak, shrub live oak, and greenleaf manzanita. The understory vegetation provides cover and forage for wildlife.

Careful management of watershed areas, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the severe hazard of erosion, disturbance of the Dedrick soil should be kept to a minimum. The potential plant community on the Dedrick soil is mainly Oregon white oak, buckbrush, soft chess, bulbous oniongrass, and silver hairgrass. The natural vegetation is mainly noncommercial hardwoods, brush, and grass. The diverse vegetation in areas of these soils provides valuable habitat for deer and other wildlife.

The land capability classification is VIIe, nonirrigated.

**116—Brownscreek-Dougcity complex, 30 to 50 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly mixed conifers. Elevation is 1,900 to 3,500 feet. The average annual precipitation is 40 to 60 inches, and the average frost-free period is 90 to 130 days. The average annual air temperature is 50 to 57 degrees F in areas of the Brownscreek soil and 45 to 57 degrees F in areas of the Dougcity soil.

This unit is 45 percent Brownscreek gravelly loam and 35 percent Dougcity gravelly loam. The Brownscreek soil commonly is on south-facing slopes or on ridgetops. The Brownscreek and Dougcity soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Sheetiron very gravelly loam, Barpeak very gravelly loam, Brownscreek and Dougcity soils that have slopes of more than 50 percent, areas of deep very gravelly clay loam, and areas of shallow very gravelly loam. Also included are small areas of Xerofluvents along stream channels under woody streamside vegetation; some areas that are barren and actively eroding because they have been used for haul roads, landings, and skid trails; and soils in which rills and gullies have formed in areas

where runoff has concentrated, such as areas that have been burned by wildfire and then disturbed during salvage harvesting activities. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Brownscreek soil is moderately deep and is well drained. It formed in residuum and colluvium derived from mica schist. Typically, 30 percent of the surface is partially covered with gravel and some cobbles and with a 1-inch mat of leaves and needles. The surface layer is strong brown gravelly loam about 6 inches thick. The upper 18 inches of the subsoil is reddish yellow very gravelly loam and very gravelly clay loam. The lower 10 inches is reddish yellow extremely gravelly loam. Extremely fractured mica schist is at a depth of about 34 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Brownscreek soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Dougcity soil is very deep and is well drained. It formed in colluvium derived from mica schist. Typically, 10 percent of the surface is partially covered with gravel and with a 1-inch mat of leaves, needles, and twigs. The surface layer is yellowish brown and light brown gravelly loam about 13 inches thick. The subsoil to a depth of 80 inches is reddish yellow very gravelly loam and yellowish red very gravelly clay loam.

Permeability is moderately slow in the Dougcity soil. Available water capacity is low or moderate. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for timber production.

Ponderosa pine, Pacific madrone, California black oak, canyon live oak, and Douglas-fir are the main tree species on the Brownscreek soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 104 for ponderosa pine on the Brownscreek soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 119 for Douglas-fir. The CACTOS 50-year site index for the Brownscreek soil is 71.

Douglas-fir, sugar pine, Pacific madrone, and California black oak are the main tree species on the Dougcity soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 115 for Douglas-fir on the Dougcity soil. The CACTOS 50-year site index for the Dougcity soil is 75.

The main concerns affecting the production and harvesting of timber are the slope, the severe hazard of erosion, and the low or moderate available water capacity. The slope limits the kinds of equipment that can be used. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The low or moderate available water capacity somewhat reduces the seedling survival rate. Trees that are suitable for planting include ponderosa pine on the Brownscreek soil and Douglas-fir and sugar pine on the Dougcity soil. The characteristic understory plant community on the Brownscreek soil is mainly poison-oak, shrub live oak, and greenleaf manzanita. The characteristic understory plant community on the Dougcity soil is mainly California hazel, snowberry, and serviceberry. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIe, nonirrigated.

**117—Brownscreek-Dougcity complex, 50 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly mixed conifers. Elevation is 1,900 to 4,500 feet. The average annual precipitation is 40 to 60 inches, and the average frost-free period is 90 to 130 days. The average annual air temperature is 50 to 57 degrees F in areas of the Brownscreek soil and 45 to 57 degrees F in areas of the Dougcity soil.

This unit is 40 percent Brownscreek gravelly loam and 40 percent Dougcity gravelly loam. The Brownscreek soil commonly is on south-facing slopes or on ridgetops. The Brownscreek and Dougcity soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Sheetiron very gravelly loam, Barpeak very gravelly loam, Brownscreek and Dougcity soils that have slopes of less than 50 percent, areas of shallow very gravelly loam, and areas of deep very gravelly clay loam. Also included are small areas of Xerofluvents along stream channels under woody streamside vegetation. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Brownscreek soil is moderately deep and is well drained. It formed in residuum and colluvium derived from mica schist. Typically, 35 percent of the surface is partially covered with gravel and some cobbles and with a 1-inch mat of leaves and needles. The surface layer is strong brown gravelly loam about 6 inches thick. The upper 18 inches of the subsoil is reddish yellow very

gravelly loam and very gravelly clay loam. The lower 10 inches is reddish yellow extremely gravelly loam. Extremely fractured mica schist is at a depth of about 34 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Brownscreek soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Dougcity soil is very deep and is well drained. It formed in colluvium derived from mica schist. Typically, 10 percent of the surface is partially covered with gravel and with a 1-inch mat of leaves, needles, and twigs. The surface layer is yellowish brown and light brown gravelly loam about 13 inches thick. The subsoil to a depth of 80 inches or more is reddish yellow very gravelly loam and yellowish red very gravelly clay loam.

Permeability is moderately slow in the Dougcity soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used for timber production.

Ponderosa pine, Pacific madrone, California black oak, canyon live oak, and Douglas-fir are the main tree species on the Brownscreek soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 104 for ponderosa pine on the Brownscreek soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 119 for Douglas-fir. The CACTOS 50-year site index for the Brownscreek soil is 71.

Douglas-fir, sugar pine, Pacific madrone, and California black oak are the main tree species on the Dougcity soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 115 for Douglas-fir on the Dougcity soil. The CACTOS 50-year site index for the Dougcity soil is 75.

The main concerns affecting the production and harvesting of timber are the slope, the severe hazard of erosion, and the low or moderate available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Careful management of reforestation is needed to reduce competition from undesirable plants and to provide partial shade for seedlings. The low or moderate available water capacity somewhat reduces the seedling survival rate. Trees that are suitable for planting include ponderosa pine on the Brownscreek soil and Douglas-fir and sugar pine on the Dougcity soil. The characteristic understory plant community on the Brownscreek soil is mainly poison-oak, shrub live oak, and greenleaf manzanita. The characteristic understory plant community on the Dougcity soil is mainly California hazel, snowberry, and serviceberry. Understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIIe, nonirrigated.

**118—Cargent-Demogul association, 50 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly brush and hardwoods on the Cargent soil and mixed conifers and hardwoods on the Demogul soil. Elevation is 1,900 to 3,600 feet. The average annual precipitation is 40 to 50 inches, and the average frost-free period is 90 to 130 days. The average annual air temperature is 57 to 62 degrees F in areas of the Cargent soil and 50 to 57 degrees F in areas of the Demogul soil.

This unit is 45 percent Cargent very gravelly sandy clay loam and 35 percent Demogul gravelly loam. The Cargent soil is mostly on spur ridgetops and south-facing slopes.

Included with these soils in mapping are small areas of Brownscreek gravelly loam under conifers; Cargent and Demogul soils that have slopes of more than 75 percent; Sheetiron very gravelly loam under conifers; Rock outcrop; Dedrick very gravelly loam under grass and hardwoods; and Barpeak very gravelly loam under conifers. Also included are small areas of Xerofluvents and Riverwash along stream channels under woody streamside vegetation and areas used as paved roadways on cuts and fills. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Cargent soil is moderately deep and is well drained. It formed in colluvium and material weathered from mica schist. Typically, 60 percent of the surface is partially covered with gravel and with a 1-inch mat of leaves and twigs. The surface layer is brown very gravelly sandy clay loam about 3 inches thick. The upper 18 inches of the subsoil is light brown very gravelly clay loam. The lower 11 inches is light brown extremely gravelly loam. Fractured mica schist is at a depth of about 32 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Cargent soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Demogul soil is very deep and is well drained. It

formed in colluvium derived from mica schist. Typically, 5 percent of the surface is partially covered with gravel and with a 2-inch mat of leaves, needles, and twigs. The surface layer is pink gravelly loam about 4 inches thick. The upper 30 inches of the subsoil is reddish yellow gravelly clay loam. The lower part of the subsoil to a depth of 68 inches or more is red gravelly clay loam.

Permeability is moderately slow in the Demogul soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe.

The Cargent soil is used as watershed, and the Demogul soil is used for timber production.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the severe hazard of erosion, disturbance of the Cargent soil should be kept to a minimum. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The potential plant community on the Cargent soil is chaparral oak, deerbrush, Oregon white oak, and annual grasses. The diverse vegetation provides cover and forage for deer and other wildlife. The natural vegetation is mainly brush.

Douglas-fir, ponderosa pine, Pacific madrone, and California black oak are the main tree species on the Demogul soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 106 for Douglas-fir. The CACTOS 50-year site index for the Demogul soil is 62.

The main concerns affecting the production and harvesting of timber on the Demogul soil are the slope, the severe hazard of erosion, and the limited available water capacity in the upper 24 inches. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Deep cuts and fills during road construction on the Demogul soil may result in slumping of the soil. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. If the site is not adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. The limited available water capacity somewhat reduces the seedling survival rate. Trees that are suitable for planting include Douglas-fir and ponderosa pine. The characteristic understory plant community on the Demogul soil is mainly shrub live oak, bigleaf maple, California hazel, and poison-oak. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important wildlife habitat.

The land capability classification is VIIe, nonirrigated.

**119—Cargent-Demogul association, 75 to 90 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly brush and hardwoods on the Cargent soil and mixed conifers and hardwoods on the Demogul soil. Elevation is 2,000 to 3,600 feet. The average annual precipitation is 40 to 50 inches, and the average frost-free period is 90 to 130 days. The average annual air temperature is 57 to 62 degrees F in areas of the Cargent soil and 50 to 57 degrees F in areas of the Demogul soil.

This unit is 60 percent Cargent very gravelly sandy clay loam and 20 percent Demogul gravelly loam. The Cargent soil is mostly on spur ridgetops and south-facing slopes.

Included with these soils in mapping are small areas of Brownscreek gravelly loam under conifers; Cargent and Demogul soils that have slopes of less than 75 percent; Rock outcrop; Dedrick very gravelly loam under grass and hardwoods; and Barpeak very gravelly loam under conifers. Also included are small areas of Xerofluvents and Riverwash along stream channels under woody streamside vegetation. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Cargent soil is moderately deep and is well drained. It formed in colluvium and residuum derived from mica schist. Typically, about 60 percent of the surface is partially covered with gravel and with a 1-inch mat of leaves and twigs. The surface layer is brown very gravelly sandy clay loam about 3 inches thick. The upper 18 inches of the subsoil is light brown very gravelly clay loam. The lower 11 inches is light brown extremely gravelly loam. Fractured mica schist is at a depth of about 32 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Cargent soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is very severe.

The Demogul soil is very deep and is well drained. It formed in colluvium derived from mica schist. Typically, 5 percent of the surface is partially covered with gravel and with a 2-inch mat of leaves, needles, and twigs. The surface layer is pink gravelly loam about 4 inches thick. The upper 30 inches of the subsoil is reddish yellow gravelly clay loam. The lower part of the subsoil to a depth of 68 inches or more is red gravelly clay loam.

Permeability is moderately slow in the Demogul soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is very severe.

The Cargent soil is used as watershed, and the Demogul soil is used for timber production.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the hazard of erosion, disturbance of the Cargent soil should be kept to minimum. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The potential plant community on the Cargent soil is chaparral oak, deerbrush, Oregon white oak, and annual grasses. The diverse vegetation provides cover and forage for deer and other wildlife. The natural vegetation is mainly brush.

Douglas-fir, ponderosa pine, Pacific madrone, and California black oak are the main tree species on the Demogul soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 106 for Douglas-fir. The CACTOS 50-year site index for the Demogul soil is 62.

The main concerns affecting the production and harvesting of timber are the slope, the hazard of erosion, and the limited available water capacity in the upper 24 inches. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Deep cuts and fills during the construction of roads on the Demogul soil may result in slumping of the soil. Careful management of reforestation is needed to reduce competition from undesirable plants and to provide partial shade for seedlings. The limited available water capacity of the Demogul soil somewhat reduces the seedling survival rate. Trees that are suitable for planting include Douglas-fir and ponderosa pine. The characteristic understory plant community on the Demogul soil is mainly shrub live oak, bigleaf maple, California hazel, and poison-oak. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIIe, nonirrigated.

**120—Caris extremely gravelly sandy loam, 50 to 75 percent slopes.** This moderately deep, well drained soil is on mountains. It formed in residuum and colluvium derived from metasedimentary rocks. Areas are dissected by perennial streams. The native vegetation is mainly conifers and hardwoods. Elevation is 2,500 to 4,750 feet. The average annual precipitation is 50 to 60 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 60 percent of the surface is partially covered with gravel and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is light brownish gray extremely gravelly sandy loam about 3 inches thick. The subsoil and substratum are light gray extremely gravelly loam and extremely gravelly sandy loam about 30 inches thick. Fractured metasedimentary rock is at a depth of about 33 inches. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Marpa very gravelly sandy clay loam, Hoosimbim extremely gravelly sandy loam, Brownbear very gravelly loam, and Indleton extremely gravelly sandy loam. Also included are small areas of Caris soils that have slopes of more than 75 percent; areas of Xerofluvents along drainageways under woody streamside vegetation, such as alder and willow; areas of Goulding very gravelly loam; and areas that are barren and actively eroding because they have been used for haul roads, landings, and skid trails or were burned by wildfire and then highly disturbed by salvage harvesting activities. Rills and gullies have formed in areas where runoff has concentrated. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Caris soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This soil is used for timber production.

Douglas-fir, ponderosa pine, sugar pine, Pacific madrone, and canyon live oak are the main tree species. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 101 for Douglas-fir. The CACTOS 50-year site index is 64.

The main concerns affecting the production and harvesting of timber are the severe hazard of erosion, the slope, the very low available water capacity, and the gravel on the surface. Maintaining the understory vegetation helps to control erosion. Proper design of road drainage systems and care in the placement of culverts also help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked,

normal stand of trees. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Loose surface material may move down the slope and reduce the seedling survival rate. If windrowing is considered in areas of this soil, care should be taken to avoid removal of the upper part of the surface layer because the soil is only moderately deep over bedrock and has nutrients concentrated in a thin surface layer. The removal of the surface layer increases the seedling mortality rate and reduces productivity. Constructing the windrows on the contour helps to prevent erosion caused by the concentration of surface runoff. Trees that are suitable for planting include ponderosa pine on south- and west-facing slopes and Douglas-fir and ponderosa pine on north- and east-facing slopes. The characteristic understory plant community is mainly California hazel, western brackenfern, canyon live oak, and Pacific dogwood. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIIe, nonirrigated.

**121—Caris extremely gravelly sandy loam, 75 to 90 percent slopes.** This moderately deep, well drained soil is on mountains. It formed in residuum and colluvium derived from metasedimentary rocks. The native vegetation is mainly conifers and hardwoods. Elevation is 2,500 to 4,750 feet. The average annual precipitation is 50 to 60 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 60 percent of the surface is partially covered with gravel and with a 1-inch mat of needles, twigs, leaves, and cones. The surface layer is light brownish gray extremely gravelly sandy loam about 3 inches thick. The subsoil and substratum are light gray extremely gravelly loam and extremely gravelly sandy loam about 30 inches thick. Fractured metasedimentary rock is at a depth of about 33 inches. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Marpa very gravelly sandy clay loam, 50 to 75 percent slopes; Indleton extremely gravelly sandy loam, 50 to 75 percent slopes; and Caris soils that have slopes of less than 75 percent. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Caris soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is very severe.

This soil is used for timber production.

Douglas-fir, ponderosa pine, sugar pine, Pacific madrone, and canyon live oak are the main tree species. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the main site index is 101 for Douglas-fir. The CACTOS 50-year site index is 64.

The main concerns affecting the production and harvesting of timber are the hazard of erosion, the slope, the very low available water capacity, and the gravel on the surface. Maintaining the understory vegetation helps to control erosion. Proper design of road drainage systems and care in placement of culverts also help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope seriously restricts harvesting activities. Cable yarding systems are suited to this unit. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Loose surface material may move down the slope and reduce the seedling survival rate. Among the trees that are suitable for planting is ponderosa pine on south- and west-facing slopes and Douglas-fir and ponderosa pine on north-facing slopes. The characteristic understory plant community is mainly California hazel, western brackenfern, canyon live oak, and Pacific dogwood. The understory vegetation provides cover and forage for wildlife.

The land capability classification is VIIe, nonirrigated.

**122—Caris-Indleton-Hoosimbim complex, 50 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly mixed conifers, hardwoods, and brush. Elevation is 2,100 to 4,900 feet. The average annual precipitation is 35 to 60 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 35 percent Caris extremely gravelly sandy loam, 25 percent Indleton extremely gravelly sandy loam, and 20 percent Hoosimbim extremely gravelly sandy loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Bamtush extremely gravelly loam and Goulding very gravelly loam and areas that have slopes of less than 50 percent. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Caris soil is moderately deep and is well drained. It formed in colluvium derived from sedimentary rocks. Typically, 60 percent of the surface is partially covered with gravel and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is light brownish gray extremely gravelly sandy loam about 3 inches thick. The subsoil and substratum are light

gray extremely gravelly loam and extremely gravelly sandy loam about 30 inches thick. Fractured metasedimentary rock is at a depth of about 33 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Caris soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Indleton soil is very deep and is well drained. It formed in residuum and colluvium derived from metasedimentary rocks. Typically, 45 percent of the surface is partially covered with gravel and with a 1-inch mat of leaves, needles, twigs, and cones. The surface layer is grayish brown and pale brown extremely gravelly sandy loam about 11 inches thick. The upper 11 inches of the subsoil is pale brown extremely gravelly sandy loam. The lower part of the subsoil to a depth of 60 inches or more is pale brown extremely gravelly sandy clay loam and extremely gravelly sandy loam.

Permeability is moderate in the Indleton soil. Available water capacity is very low. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe.

The Hoosimbim soil is deep and well drained. It formed in material weathered from sedimentary rocks. Typically, 50 percent of the surface is partially covered with angular gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is yellowish brown extremely gravelly sandy loam about 4 inches thick. The upper 12 inches of the subsoil is brown and light brown very gravelly sandy clay loam. The lower 26 inches is reddish yellow extremely gravelly sandy clay loam. Fractured metasedimentary rock is at a depth of about 42 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderate in the Hoosimbim soil. Available water capacity is very low or low. The effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for timber production.

Douglas-fir, ponderosa pine, canyon live oak, sugar pine, and Pacific madrone are the main tree species on the Caris soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 101 for Douglas-fir on the Caris soil. The CACTOS 50-year site index for the Caris soil is 64.

Douglas-fir, sugar pine, Pacific madrone, canyon live oak, and Pacific dogwood are the main tree species on the Indleton soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 127 for Douglas-fir on the Indleton soil. The CACTOS 50-year site index for the Indleton soil is 76.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and Pacific madrone are the main tree species on the Hoosimbim soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 102 for Douglas-fir on the Hoosimbim soil. The CACTOS 50-year site index for the Hoosimbim soil is 66.

The main concerns affecting the production and harvesting of timber are the severe hazard of erosion, the slope, the very low or low available water capacity, and the gravel on the surface. Maintaining the understory vegetation helps to control erosion. Proper design of road drainage systems and care in the placement of culverts also help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Loose surface material may move down the slope and reduce the seedling survival rate. Trees that are suitable for planting include ponderosa pine on south- and west-facing slopes and Douglas-fir and ponderosa pine on north- and east-facing slopes. The characteristic understory plant community is mainly California hazel, western brackenfern, shrub live oak, and Pacific dogwood on the Caris and Indleton soils and deerbrush and poison-oak on the Hoosimbim soil. The understory vegetation provides cover and forage for wildlife.

The land capability classification is VIIe, nonirrigated.

**123—Carrcreek gravelly loam, 0 to 2 percent slopes.** This very deep, well drained soil is on stream terraces and alluvial fans. It formed in alluvium derived from mixed rock sources. The native vegetation in areas that have not been cultivated is mainly oaks, brush, grass, and forbs and scattered clumps of oaks mixed with conifers. Historically, areas of this soil were covered with a light, uneven canopy of Oregon white oak and ponderosa pine. Elevation is 2,200 to 2,700 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface layer is brown gravelly loam about 12 inches thick. The upper 38 inches of the subsoil is brown and dark yellowish brown very gravelly

clay loam. The lower part to a depth of 60 inches or more is dark yellowish brown very gravelly sandy clay loam.

Included with this soil in mapping are small areas of Haysum gravelly loam on the upper parts of stream terraces; areas of very deep, rapidly permeable gravelly loam underlain by very gravelly sand near stream channels; and areas of Crefork loam under oaks on hills. Also included are small areas of a very deep, fine textured soil that has a water table at a depth of 24 to 36 inches along Hyampom Road near the eastern soil survey boundary and areas of Jafa loam under conifers on hills. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Carrcreek soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This soil is used for pastureland, hayland, or homesite development.

Few limitations affect the use of this soil as pastureland or hayland. Under optimum management and weather conditions, irrigated pastureland can produce about 8 animal unit months per acre per year. Areas used as irrigated hayland can produce about 4 tons of grass hay per acre per year, and areas used as nonirrigated hayland can produce 1.25 tons of grass hay per acre per year.

Few limitations affect the use of this soil for homesite or urban development. Gravel and cobbles should be removed for landscaping in disturbed areas, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants.

The land capability classification is IIIs-1, irrigated and nonirrigated.

**124—Carrcreek gravelly loam, 2 to 5 percent slopes.** This very deep, well drained soil is on stream terraces and alluvial fans. It formed in alluvium from mixed rock sources. The vegetation in areas that have not been cultivated is mainly oaks, brush, grasses, and forbs and scattered clumps of oaks mixed with conifers. Historically, this soil was covered with a light, uneven canopy of Oregon white oak and ponderosa pine. Elevation is 2,200 to 2,600 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface layer is brown gravelly loam about 12 inches thick. The upper 38 inches of the subsoil is brown and dark yellowish brown very gravelly clay loam. The lower part to a depth of 60 inches or more is dark yellowish brown very gravelly sandy clay loam.

Included with this soil in mapping are small areas of Haysum soils on the upper parts of stream terraces; areas of very deep, rapidly permeable gravelly loam underlain by very gravelly sand near stream channels; small areas of Jafa loam under conifers on hills; and areas of Crefork loam, 8 to 15 percent slopes, under oaks on hills. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Carrcreek soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This soil is used for pastureland, hayland, or homesite development.

Few limitations affect the use of this soil as pastureland or hayland. Under optimum management and weather conditions, irrigated pastureland can produce about 8 animal unit months per acre per year. Areas used as irrigated hayland can produce about 4 tons of grass hay per acre per year, and areas used as nonirrigated hayland can produce 1.25 tons of grass hay per acre per year.

Few limitations affect the use of this soil for homesite or urban development. Gravel and cobbles should be removed for landscaping in disturbed areas, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants.

The land capability classification is IIIs-1, irrigated and nonirrigated.

**125—Choop fine gravelly loamy coarse sand, 50 to 75 percent slopes.** This shallow, excessively drained soil is on mountains. It formed in material weathered from granitic rocks. The native vegetation is mainly brush. Elevation is 4,000 to 5,000 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 30 percent of the surface is partially covered with fine gravel. The surface layer is dark grayish brown or gray fine gravelly loamy coarse sand about 5 inches thick. The underlying material to a depth of 16 inches is variegated grayish brown to very pale brown very gravelly loamy coarse sand and extremely gravelly loamy coarse sand. Soft, granitic rock is at a depth of about 16 inches. The depth to bedrock ranges from 10 to 20 inches.

Included with this soil in mapping are small areas of Valcreek very gravelly loamy coarse sand under conifers and brush and areas of moderately deep fine

gravelly loamy sand under brush. Also included are small areas of Minersville Variant fine gravelly loamy coarse sand on the upper slopes under conifers and Minersville sandy loam on the lower slopes under conifers. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability is rapid in the Choop soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is very severe.

This soil is used as watershed, recreational areas, or wildlife habitat.

Careful management of watershed areas, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the hazard of erosion, disturbance of the soil should be kept to a minimum. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars and by seeding fills. Straw mulching also helps to control erosion. This soil produces vegetation that provides cover and forage for wildlife. The potential plant community is mainly greenleaf manzanita, shrub tanoak, Sierra chinkapin, and chaparral oak. The natural vegetation is mainly brush.

The land capability classification is VIIs, nonirrigated.

**126—Choop-Rock outcrop complex, 50 to 90 percent slopes.** This map unit is on mountains. The native vegetation is mainly brush. Elevation is 4,500 to 5,600 feet. The average annual precipitation is 65 to 70 inches, the average annual air temperature is 43 to 45 degrees F, and the average frost-free period is 70 to 90 days.

This unit is 60 percent Choop fine gravelly loamy coarse sand and 20 percent Rock outcrop. The Choop soil and the Rock outcrop occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Minersville Variant fine gravelly loamy coarse sand under conifers. Also included are small areas of Valcreek very gravelly loamy coarse sand; areas of Minersville sandy loam on the lower slopes; areas of Haploxerolls, 2 to 9 percent slopes, along drainageways; and areas that have stones and boulders on the surface. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Choop soil is shallow and excessively drained. It formed in material weathered from granitic rock. Typically, 40 percent of the surface is partially covered with fine gravel. The surface layer is very dark grayish brown or dark brown fine gravelly loamy coarse sand about 12 inches thick. Soft granitic rock is at a depth of about 12 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is rapid in the Choop soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid or very rapid, and the hazard of water erosion is very severe.

Rock outcrop consists of cliffs, ledges, and knobs of exposed bedrock on the upper mountain slopes and ridgetops. Except in isolated pockets of shallow soils, the Rock outcrop supports no vegetation.

This unit is used as watershed areas, recreational areas, or wildlife habitat.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the hazard of erosion, disturbance of the Choop soil should be kept to a minimum. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars and by seeding fills. Straw mulching also helps to control erosion. The Choop soil produces vegetation that provides cover and forage for wildlife. The potential plant community on the Choop soil is mainly greenleaf manzanita, shrub tanoak, Sierra chinkapin, and squawcarpet. The natural vegetation is mainly brush.

Rock outcrop provides denning, nesting, and sunning areas for wildlife, including raptors, mammals, and reptiles.

The land capability classification of the Choop soil is VIIe, nonirrigated, and that of the Rock outcrop is VIII.

**127—Crefork loam, 2 to 9 percent slopes.** This very deep, well drained soil is on hills. It formed in material weathered from weakly consolidated mudstone and bedded sedimentary deposits. The native vegetation is mainly grasses, oaks, and brush and scattered conifers. Elevation is 2,300 to 3,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface layer is brown loam about 5 inches thick. The upper 38 inches of the subsoil is brown and light brownish gray clay. The lower part of the subsoil to a depth of 63 inches or more is pale brown gravelly clay loam.

Included with this soil in mapping are small areas of

a moderately deep, clayey soil and areas of Crefork soils that have slopes of more than 9 percent. Also included are small areas of Carrcreek gravelly loam, Haysum gravelly loam, and Xererts. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability is very slow in the Crefork soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight.

This soil is used for wood products, pastureland, or homesite development.

Oregon white oak and digger pine are the main tree species. This soil can produce 13 cords of oak per acre from a stand of trees that average 8 inches in diameter at a height of 4.5 feet.

The main limitation affecting the harvesting of trees is the clay texture in the subsoil, which results in low strength. Erosion is a hazard in the steeper areas. Unsurfaced roads and skid trails are slippery and can be easily rutted when wet, and they may be impassable during rainy periods. Management measures that improve or maintain the plant cover and promote the accumulation of litter on the surface reduce the hazard of erosion and increase the rate of water infiltration. Management practices that help to overcome low strength generally are not economically feasible. This soil produces an understory of plants suitable for grazing. The characteristic understory plant community is mainly buckbrush, Idaho fescue, blue wildrye, Lemmon needlegrass, and greenleaf manzanita.

Few limitations affect the use of this soil as pastureland. Grazing during wet periods can result in surface compaction and the uprooting of plants. Under optimum management and weather conditions, areas used as nonirrigated native pastureland can produce about 3 animal unit months per acre per year.

If this soil is used for homesite development, the main limitations are the very slow permeability, a high shrink-swell potential, and the low strength. If the soil is used as a site for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to overcome the restricted permeability. During the rainy season, however, the absorption fields could still fail. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential. Plans for homesite development should provide for the preservation of as many trees as possible. Only the part of the site that is used for construction should be disturbed. The design of buildings and roads should offset the limited ability of the soil to support a load. The possibility of settlement can be minimized by compacting the building site before construction is begun.

The land capability classification is IIIe-3, nonirrigated.

**128—Crefork loam, 9 to 15 percent slopes.** This very deep, well drained soil is on hills. It formed in material weathered from weakly consolidated mudstone and bedded sedimentary deposits. The native vegetation is mainly grasses, oaks, and brush and scattered conifers. Elevation is 2,300 to 3,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface layer is brown loam about 5 inches thick. The upper 38 inches of the subsoil is brown and light brownish gray clay. The lower part of the subsoil to a depth of 63 inches or more is pale brown gravelly clay loam.

Included with this soil in mapping are small areas of a moderately deep, clayey soil on hills; Crefork soils that have slopes of more than 15 percent; Xererts that have 9 to 15 percent slopes; and Haysum gravelly loam, 2 to 5 percent slopes. Also included are small areas of Jafa gravelly loam, 2 to 9 percent slopes, and Jafa loam on old terraces under conifers. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability is very slow in the Crefork soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight.

This soil is used for wood products, pasture, or homesite development.

Oregon white oak and some digger pine are the main tree species. This soil can produce 13 cords of wood per acre from a stand of trees that average 8 inches in diameter at a height of 4.5 feet.

The main limitation affecting the harvesting of trees is the clay texture in the subsoil, which results in low strength. Erosion is a hazard in the steeper areas. Unsurfaced roads and skid trails are slippery and can be easily rutted when wet, and they may be impassable during rainy periods. Management measures that improve or maintain the plant cover and promote the accumulation of litter on the surface reduce the hazard of erosion and increase the rate of water infiltration. Management practices that help to overcome low strength generally are not economically feasible. This soil produces an understory of plants suitable for grazing. The characteristic understory plant community is mainly buckbrush, Idaho fescue, blue wildrye, Lemmon needlegrass, and greenleaf manzanita.

If this soil is used as pastureland, the main concern

is the moderate hazard of erosion. Grazing when the soil is too wet results in compaction of the surface layer and poor tilth and increases the hazard of erosion. Under optimum management and weather conditions, areas used as nonirrigated native pastureland can produce about 3 animal unit months per acre per year.

If this soil is used for homesite development, the main concerns are the very slow permeability, a high shrink-well potential, the moderate hazard of erosion, the slope, and the low strength. If the soil is used as a site for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to overcome the restricted permeability. During the rainy season, however, the absorption field could still fail. The slope is also a concern in areas used for septic tank absorption fields. Absorption lines should be installed on the contour. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Plans for homesite development should provide for the preservation of as many trees as possible. The design of buildings and roads should offset the limited ability of the soil to support a load. The possibility of settlement can be minimized by compacting the building site before construction is begun.

The land capability classification is IIIe-3, nonirrigated.

**129—Crefork clay loam, 15 to 30 percent slopes.** This very deep, well drained soil is on hills. It formed in material weathered from weakly consolidated mudstone and bedded sedimentary deposits. The native vegetation is mainly grasses, oaks, and brush and scattered conifers. Elevation is 2,300 to 3,600 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface layer is brown loam about 5 inches thick. The upper 38 inches of the subsoil is brown and light brownish gray clay. The lower part of the subsoil to a depth of 63 inches or more is pale brown gravelly clay loam.

Included with this soil in mapping are small areas of moderately deep, clayey soils on hilltops; Carrcreek gravelly loam, 2 to 5 percent slopes; Jafa loam on terraces under conifers; and Jafa gravelly loam, 2 to 9 percent slopes, on terraces under conifers. Also included are small areas of Xererts, 2 to 9 percent slopes, and areas of Crefork soils, on hilltops, that have slopes of less than 15 percent. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability is very slow in the Crefork soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight.

This soil is used for wood products, pastureland, or homesite development.

Oregon white oak and digger pine are the main tree species. This soil can produce 13 cords of wood per acre from a stand of trees that average 8 inches in diameter at a height of 4.5 feet.

The main limitations affecting the harvesting of trees are the moderate hazard of erosion and low strength. Unsurfaced roads and skid trails are slippery and can be easily rutted when wet, and they may be impassable during rainy periods. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Management measures that improve or maintain the plant cover and promote the accumulation of litter on the surface reduce the hazard of erosion and increase the rate of water infiltration. Management practices that help to overcome low strength generally are not economically feasible. This soil produces an understory of plants suitable for grazing. The characteristic understory plant community is mainly buckbrush, Idaho fescue, blue wildrye, Lemmon needlegrass, and greenleaf manzanita.

If this soil is used as pastureland, the main concern is the hazard of erosion. Grazing when the soil is too moist results in compaction of the surface layer and poor tilth and increases the hazard of erosion. Under optimum management and weather conditions, areas used as nonirrigated native pastureland can produce about 2 animal unit months per acre per year.

If this soil is used for homesite development, the main concerns are the very slow permeability, a high shrink-swell potential, the moderate hazard of erosion, the slope, and the low strength. If the soil is used as a site for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the restricted permeability. During the rainy season, however, the absorption field could still fail. The slope is also a concern in areas used for septic tank absorption fields. Absorption lines should be installed on the contour. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Plans for homesite development should provide for the

preservation of as many trees as possible. The design of buildings and roads should offset the limited ability of the soil to support a load. The possibility of settlement can be minimized by compacting the building site before construction is begun.

The land capability classification is IVe-3, nonirrigated.

**131—Crefork-Musserhill complex, 30 to 50 percent slopes.** This map unit is on hills. The native vegetation is mainly grasses, forbs, brush, oaks, and some conifers. The Musserhill soil supports more conifers than the Crefork soil. Elevation is 2,300 to 3,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 50 percent Crefork loam and 30 percent Musserhill gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Jafa gravelly loam, 2 to 9 percent slopes; Carrcreek gravelly loam, 2 to 5 percent slopes; Crefork soils that have slopes of less than 30 percent; and areas of moderately deep, clayey soils on ridgetops. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Crefork soil is very deep and is well drained. It formed in material weathered from weakly consolidated mudstone and bedded sedimentary deposits. Typically, the surface layer is brown loam about 5 inches thick. The upper 38 inches of the subsoil is brown and light brownish gray clay. The lower part of the subsoil to a depth of 63 inches or more is pale brown gravelly clay loam.

Permeability is very slow in the Crefork soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight.

The Musserhill soil is moderately deep and is well drained. It formed in material weathered from weakly consolidated conglomerate. Typically, the surface is partially covered with a mat of leaves, twigs, and grass stems. This mat is about ½ inch thick. The surface layer is brown gravelly loam about 5 inches thick. The upper 6 inches of the subsoil is reddish brown very gravelly clay loam. The lower 21 inches is reddish brown extremely cobbly clay loam. Weakly consolidated conglomerate is at a depth of about 32 inches. The depth to weakly consolidated conglomerate ranges from 20 to 40 inches.

Permeability is moderately slow in the Musserhill soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used mainly for wood products or for pasture. Some areas are used for homesite development.

Oregon white oak and digger pine are the main tree species. The Crefork soil can produce 13 cords of wood per acre from a stand of trees that average 8 inches in diameter at a height of 4.5 feet. The Musserhill soil can produce 18 cords of wood per acre from a stand of trees that average 8 inches in diameter at a height of 4.5 feet.

The main limitations affecting the harvesting of trees are the hazard of erosion and the slope. The Crefork soil also is limited by low strength. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars and by seeding fills. Unsurfaced roads and skid trails are slippery when wet, and they may be impassable during rainy periods. Management measures that improve or maintain the plant cover and promote the accumulation of litter on the surface reduce the hazard of erosion and increase the rate of water infiltration.

If the Crefork soil is used for pasture, the main concern is the hazard of erosion. Grazing when the soil is wet results in compaction of the surface layer and poor tilth and increases the hazard of erosion. Under optimum management and weather conditions, areas used as native pasture can produce about 2 animal unit months per acre per year.

If this unit is used for homesite development, the main concerns are the slope, the severe hazard of erosion, and the restricted permeability. The Crefork soil also is limited by a high shrink-swell potential, and the Musserhill soil is limited by the depth to weakly consolidated conglomerate. Small areas that have low slopes are best suited to building site development. If these soils are used as sites for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the restricted permeability. During the rainy season, however, septic tank absorption fields could still fail. The slope also is a concern in areas used for septic tank absorption fields. Absorption lines should be installed on the contour. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Plans for homesite development should provide for the preservation of as

many trees as possible. The design of buildings and roads should offset the limited ability of the Crefork soil to support a load. The possibility of settlement can be minimized by compacting the building site before construction is begun. On the Musserhill soil, cuts that are needed to provide essentially level building sites can expose the weakly consolidated conglomerate. Also, the depth to weakly consolidated conglomerate severely limits the functioning of septic tank absorption fields on the Musserhill soil.

The land capability classification is VIe, nonirrigated.

**132—Dedrick gravelly loam, 50 to 75 percent slopes.** This shallow, somewhat excessively drained soil is on mountains. It formed in residuum and colluvium derived from metavolcanic rocks. The native vegetation is mainly brush and grasses. Elevation is 1,500 to 2,700 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 57 to 63 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 40 percent of the surface is partially covered with gravel. The surface layer is brown gravelly loam about 3 inches thick. The subsoil is brown very gravelly loam and strong brown extremely gravelly loam about 12 inches thick. Fractured schist bedrock is at a depth of about 15 inches. The depth to bedrock ranges from 10 to 20 inches.

Included with this soil in mapping are small areas of very gravelly loam that is 20 to 40 inches deep over soft, weathered bedrock; Brockgulch very gravelly loam under canyon live oak and digger pine; and Brownbear very gravelly loam under mixed conifers and hardwoods. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Dedrick soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This soil is used as watershed, recreational areas, or wildlife habitat.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the hazard of erosion, disturbance of the soil should be kept to a minimum. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads can be protected against erosion by constructing water bars and by seeding, mulching, and using filter strips where necessary. The potential plant community is mainly chaparral oak, greenleaf manzanita, whiteleaf manzanita, deerbrush, and grasses. This vegetation provides food and cover for wildlife. The natural vegetation is mainly brush.

The land capability classification is VIIe, nonirrigated.

**133—Dedrick-Rock outcrop complex, 50 to 75 percent slopes.** This map unit is on mountain ridgetops. The native vegetation is mainly grasses and brush and scattered hardwoods and conifers. Elevation is 1,500 to 3,700 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is 57 to 63 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 50 percent Dedrick very gravelly loam and 30 percent Rock outcrop. The Dedrick soil and the Rock outcrop occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Brockgulch very gravelly loam under canyon live oak and Holkat Variant gravelly loam under dense stands of California black oak and Oregon white oak. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Dedrick soil is shallow and somewhat excessively drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, 60 percent of the surface is partially covered with gravel and 10 percent is partially covered with cobbles. The surface layer is dark yellowish brown very gravelly loam about 3 inches thick. The subsoil is yellowish brown extremely gravelly loam about 12 inches thick. Fractured schist is at a depth of about 15 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Dedrick soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

Rock outcrop consists of cliffs, ledges, and knobs of exposed bedrock. Except in isolated pockets of shallow included soils, the Rock outcrop supports no vegetation.

This unit is used as watershed, recreational areas, or wildlife habitat.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the hazard of erosion, disturbance of the Dedrick soil should be kept to a minimum. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars and by seeding, mulching, and using filter strips where necessary. Most areas of the Dedrick soil support less

than 10 percent tree canopy. The potential plant community is mainly buckbrush, birchleaf mountainmahogany, grasses, and scattered canyon live oak and digger pine. The vegetation provides cover and forage for wildlife. The natural vegetation is mainly brush. Where the soil supports a canopy of trees, canyon live oak and digger pine are the main species. The Dedrick soil can produce 24 cords of wood per acre from a stand of trees that average 10 inches in diameter at a height of 4.5 feet. The slope limits accessibility for cutting wood and restricts the use of equipment.

Rock outcrop provides denning, nesting, and sunning areas for wildlife, including mammals, raptors, and reptiles.

The land capability classification of the Dedrick soil is VIIe, nonirrigated, and that of the Rock outcrop is VIII.

**134—Demogul gravelly loam, 50 to 75 percent slopes.** This very deep, well drained soil is on mountains. It formed in colluvium derived from mica schist. The native vegetation is mainly mixed conifers and hardwoods. Elevation is 1,700 to 3,200 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 5 percent of the surface is partially covered with gravel and with a 2-inch mat of needles, twigs, and leaves. The surface layer is pink gravelly loam about 4 inches thick. The upper 30 inches of the subsoil is reddish yellow gravelly clay loam. The lower part of the subsoil to a depth of 68 inches or more is red gravelly clay loam.

Included with this soil in mapping are small areas of Barpeak very gravelly loam, Sheetiron very gravelly loam, Brownscreek gravelly loam, and Dougcity gravelly loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately slow in the Demogul soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe.

This soil is used for timber production.

Douglas-fir, ponderosa pine, Pacific madrone, and California black oak are the main tree species. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 106 for Douglas-fir. The CACTOS 50-year site index is 62.

The main concerns affecting the production and harvesting of timber are the slope, the severe hazard of erosion, and the limited available water capacity in the upper 24 inches. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Deep cuts and fills made during the construction of roads may result in slumping of the soil. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Careful management of reforestation is needed to reduce competition from undesirable understory plants. If the site is not adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. The limited available water capacity in the upper 24 inches reduces the seedling survival rate. Trees that are suitable for planting include Douglas-fir and ponderosa pine. The characteristic understory plant community is mainly shrub live oak, bigleaf maple, California hazel, and poison-oak. The understory vegetation provides cover and forage for wildlife.

The land capability classification is VIIe, nonirrigated.

**136—Dougcity-Dedrick complex, 50 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly mixed conifers and hardwoods on the Dougcity soil and hardwoods, brush, and grass on the Dedrick soil. Elevation is 1,750 to 3,000 feet. The average annual precipitation is 30 to 40 inches, and the average frost-free period is 90 to 130 days. The average annual air temperature is 50 to 57 degrees F in areas of the Dougcity soil and 57 to 63 degrees F in areas of the Dedrick soil.

This unit is 45 percent Dougcity gravelly loam and 35 percent Dedrick very gravelly loam. The Dedrick soil is mostly on spur ridgetops.

Included with these soils in mapping are small areas of Brownscreek gravelly loam; Demogul gravelly loam; Weaverville loam, 30 to 50 percent slopes; and Xerofluvents. These included soils are along stream channels and support woody streamside vegetation, such as willow and alder. They make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Dougcity soil is very deep and is well drained. It formed in colluvium derived from mica schist. Typically, 10 percent of the surface is partially covered with gravel and with a 1-inch mat of leaves, needles, and twigs. The surface layer is yellowish brown and light brown gravelly loam about 13 inches thick. The subsoil to a depth of 80 inches or more is reddish yellow very gravelly loam and yellowish red very gravelly clay loam.

Permeability is moderately slow in the Dougcity soil. Available water capacity is low or moderate. The

effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe.

The Dedrick soil is shallow and somewhat excessively drained. It formed in residuum and colluvium derived from mica schist. Typically, 60 percent of the surface is partially covered with gravel and 10 percent is partially covered with cobbles. The surface layer is dark yellowish brown very gravelly loam about 3 inches thick. The subsoil is yellowish brown extremely gravelly loam about 12 inches thick. Fractured schist is at a depth of about 15 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Dedrick soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Dougcity soil is used for timber production. The Dedrick soil is used as watershed, recreational areas, or wildlife habitat.

Douglas-fir, sugar pine, Pacific madrone, and California black oak are the main tree species on the Dougcity soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 115 for Douglas-fir on the Dougcity soil. The CACTOS 50-year site index for the Dougcity soil is 75.

The main concerns affecting the production and harvesting of timber on the Dougcity soil are the slope, the severe hazard of erosion, and the limited available water capacity in the upper 24 inches. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Careful management of reforestation is needed to reduce competition from undesirable understory plants. If the site is not adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. The limited available water capacity reduces the seedling survival rate. Trees that are suitable for planting include Douglas-fir and ponderosa pine. The characteristic understory plant community is mainly California hazel, snowberry, and serviceberry. The understory vegetation provides cover and forage for wildlife.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the hazard of erosion, disturbance of the Dedrick soil should be kept to a minimum. The potential plant community on the Dedrick soil is mainly Oregon white oak, buckbrush, soft chess, bulbous oniongrass, and silver hairgrass. The natural vegetation is mainly brush. The diverse vegetation in this unit provides valuable habitat for deer and other wildlife. Streamside vegetation also provides important habitat for wildlife.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. Septic tank absorption fields do not function properly because of the slope and the shallow depth of the Dedrick soil.

The land capability classification is VIIe, nonirrigated.

**137—Dougcity-Demogul complex, 50 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly mixed conifers. Elevation is 2,100 to 3,100 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Dougcity gravelly loam and 35 percent Demogul gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Dougcity and Demogul soils that have slopes of 15 to 50 percent; Brownscreek gravelly loam; Dubakella cobbly clay loam under Jeffrey pine and incense cedar; Xerofluvents along stream channels; areas of a deep, clayey soil; and Weitchpec gravelly loam under Jeffrey pine and incense cedar. Also included are small areas of Musserhill gravelly loam under Oregon white oak and ponderosa pine. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Dougcity soil is very deep and is well drained. It formed in colluvium derived from mica schist. Typically, 10 percent of the surface is partially covered with gravel and with a 1-inch mat of leaves, needles, and twigs. The surface layer is yellowish brown and light brown gravelly loam about 13 inches thick. The subsoil to a depth of 80 inches or more is reddish yellow very gravelly loam and yellowish red very gravelly clay loam.

Permeability is moderately slow in the Dougcity soil. Available water capacity is low or moderate. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe.

The Demogul soil is very deep and is well drained. It formed in colluvium derived from mica schist. Typically, 5 percent of the surface is partially covered with gravel and with a 2-inch mat of leaves, needles, twigs, and branches. The surface layer is pink gravelly loam about 4 inches thick. The upper 30 inches of the subsoil is

reddish yellow gravelly clay loam. The lower part of the subsoil to a depth of 68 inches or more is red gravelly clay loam.

Permeability is moderately slow in the Demogul soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is very severe.

This unit is used mainly for timber production.

Douglas-fir, sugar pine, Pacific madrone, and California black oak are the main tree species on the Dougcity soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 115 for Douglas-fir on the Dougcity soil. The CACTOS 50-year site index for the Dougcity soil is 75.

Douglas-fir, ponderosa pine, Pacific madrone, and California black oak are the main tree species on the Demogul soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 106 for Douglas-fir on the Demogul soil. The CACTOS 50-year site index for the Demogul soil is 62.

The main concerns affecting the production and harvesting of timber are the slope, the severe hazard of erosion, and the limited available water capacity in the upper 24 inches. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Deep cuts and fills made during the construction of roads on the Demogul soil may result in slumping of the soil. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. If the site is not adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. The limited available water capacity in the upper 24 inches somewhat reduces the seedling survival rate. Trees that are suitable for planting include Douglas-fir and sugar pine on the Dougcity soil and Douglas-fir and ponderosa pine on the Demogul soil. The characteristic understory plant community on the Dougcity soil is mainly California hazel, snowberry, and serviceberry. The characteristic understory plant community on the Demogul soil is mainly shrub live oak, bigleaf maple, California hazel, and poison-oak. The understory vegetation provides cover and forage for wildlife.

If these soils are used for homesite development, the main concerns are the slope and the hazard of erosion. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Soils disturbed by construction are subject to erosion during the rainy season. Temporary erosion-control measures may be necessary. The design of access roads should provide stable cut and fill slopes, and drains are needed to control surface runoff and keep soil losses to a minimum. The slope is also a concern in areas used for septic tank absorption fields. Absorption lines should be installed on the contour. Plans for homesite development should provide for the preservation of as many trees as possible.

The land capability classification is VIIe, nonirrigated.

**138—Dubakella cobbly clay loam, 15 to 30 percent slopes.** This moderately deep, well drained soil is on mountains. It formed in material weathered from serpentinitic and other ultrabasic rocks. The native vegetation is mainly sparse conifers and brush. Elevation is 2,200 to 4,100 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 25 percent of the surface is partially covered with cobbles and gravel and with a 1-inch mat of needles, twigs, cones, and branches. The surface layer is reddish brown cobbly clay loam about 5 inches thick. The subsoil is yellowish red very cobbly clay loam and strong brown and yellowish red very cobbly clay about 29 inches thick. Fractured serpentinitic ultrabasic rock with clay films lining fractures is at a depth of about 34 inches. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Marpa very gravelly sandy clay loam, 30 to 50 percent slopes; areas of Hoosimbim extremely gravelly sandy loam, 30 to 50 percent slopes; areas of shallow cobbly clay loam over serpentinized ultrabasic rock; and areas of Rock outcrop on ridgetops. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is slow in the Dubakella soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This soil is used for timber production.

Jeffrey pine, incense cedar, and Douglas-fir are the main tree species on this soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 71 for Jeffrey pine. Because of the low basal area and extent of the main commercial species, yields commonly are only 60 percent of those of normal stands. The CACTOS 50-year site index is 49.

The main concerns affecting the production and harvesting of timber are the moderate hazard of erosion and the slope. Maintaining the understory vegetation helps to control erosion. Unsurfaced roads and skid trails are slippery when wet and can be easily compacted and rutted. They may be impassable during rainy periods. The low available water capacity reduces the seedling survival rate. Because of the serpentinitic conditions, species that are tolerant of nutrient imbalance should be selected for revegetation. Jeffrey pine is suitable for planting. The understory vegetation provides cover and forage for wildlife. The characteristic understory plant community is mainly buckbrush and bluegrass.

If this unit is used for homesite development, the main limitations are the depth to bedrock, the slope, the slow permeability, and the nutrient imbalance. Cuts that are needed for essentially level building sites can expose the bedrock. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Plans for homesite development should provide for the preservation of as many trees as possible. Selection of adapted vegetation is critical for the establishment of lawns, trees, and vegetable gardens. The depth to bedrock severely limits the functioning of septic tank absorption fields. If this soil is used as a site for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the slow permeability. During the rainy season, however, the absorption field could still fail. The slope also is a concern in areas used for septic tank absorption fields. Absorption lines should be installed on the contour. The design of access roads should provide stable cut and fill slopes, and drains are needed to control surface runoff and keep soil losses to a minimum. Cutbanks are not stable and are subject to slumping.

The land capability classification is VIe-9, nonirrigated.

**139—Dubakella cobbly clay loam, 30 to 50 percent slopes.** This moderately deep, well drained soil is on mountains. It formed in material weathered from serpentinitic and other ultrabasic rocks. The native vegetation is mainly sparse conifers and brush. Elevation is 3,500 to 4,100 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 25 percent of the surface is partially covered with cobbles and gravel and with a 1-inch mat of needles, twigs, cones, and branches. The surface layer is reddish brown cobbly clay loam about 5 inches thick. The subsoil is yellowish red very cobbly clay loam and strong brown and yellowish red very cobbly clay about 29 inches thick. Fractured serpentinitic ultrabasic rock is at a depth of about 34 inches. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Marpa very gravelly sandy clay loam, areas of Hoosimbim extremely gravelly sandy loam, areas of deep cobbly clay loam over serpentinized ultrabasic rock, and areas of Rock outcrop on ridgetops. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is slow in the Dubakella soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This soil is used for timber production.

Jeffrey pine, incense cedar, and Douglas-fir are the main tree species on this soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 71 for Jeffrey pine. Because of the low basal area and extent of the main commercial species, yields commonly are only 60 percent of those of normal stands. The CACTOS 50-year site index is 49.

The main concerns affecting the production and harvesting of timber are the severe hazard of erosion, the potential for mass movement, the slope, and the low available water capacity. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Unsurfaced roads and skid trails are slippery when wet and can be easily compacted and rutted. They may be impassable during rainy periods. Because of the potential for mass movement, roads and landings should be carefully located so that deep cuts and fills are avoided. The low available water capacity reduces the seedling survival rate. Because of the serpentinitic conditions, species that are tolerant of nutrient imbalance should be selected for revegetation. Jeffrey pine is suitable for planting. The understory vegetation provides cover and forage for wildlife. The characteristic understory plant community is mainly buckbrush and bluegrass.

If this unit is used for homesite development, the main concerns are the depth to bedrock, the slope, the slow permeability, the severe hazard of erosion, the potential for mass movement, and the nutrient imbalance. Cuts that are needed for essentially level building sites can expose the bedrock. Only the part of the site that is used for construction should be

disturbed. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Plans for homesite development should provide for the preservation of as many trees as possible. Selection of adapted vegetation is critical for the establishment of lawns, trees, and vegetable gardens. The depth to bedrock severely limits the functioning of septic tank absorption fields. If this soil is used as a site for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the slow permeability. During the rainy season, however, the absorption field could still fail. The slope also is a concern in areas used for septic tank absorption fields. Absorption lines should be installed on the contour. The design of access roads should provide stable cut and fill slopes, and drains are needed to control surface runoff and keep soil losses to a minimum. Cutbanks are not stable and are subject to slumping.

The land capability classification is VIe, nonirrigated.

**140—Dubakella cobbly clay loam, 50 to 75 percent slopes.** This moderately deep, well drained soil is on mountains. It formed in material weathered from serpentinitic and other ultrabasic rocks. The native vegetation is mainly sparse conifers and brush. Elevation is 2,000 to 3,500 feet. The average annual precipitation is 50 to 60 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 25 percent of the surface is partially covered with cobbles and gravel and with a 1-inch mat of needles, twigs, cones, and branches. The surface layer is reddish brown cobbly clay loam about 5 inches thick. The subsoil is yellowish red very cobbly clay loam and strong brown and yellowish red very cobbly clay about 29 inches thick. Fractured serpentinitic ultrabasic rock with clay films lining cracks is at a depth of about 34 inches. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Weitchpec Variant gravelly loam, areas of Hoosimbim extremely gravelly sandy loam, areas of deep cobbly clay loam on serpentinized ultrabasic rock, and areas of Rock outcrop on ridgetops. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is slow in the Dubakella soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This soil is used for timber production.

Jeffrey pine, incense cedar, and Douglas-fir are the main tree species on this soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 71 for Jeffrey pine. Because of the low basal area and extent of the main commercial species, yields commonly are only 60 percent of those of normal stands. The CACTOS 50-year site index is 49.

The main concerns affecting the production and harvesting of timber are the severe hazard of erosion, the potential for mass movement, the slope, and the low available water capacity. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Because of the potential for mass movement, roads and landings should be carefully located so that deep cuts and fills are avoided. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Unsurfaced roads and skid trails are slippery when wet and can be easily compacted and rutted. They may be impassable during rainy periods. The low available water capacity reduces seedling survival rate. Because of the serpentinitic conditions, species that are tolerant of nutrient imbalance should be selected for revegetation. Jeffrey pine is suitable for planting. The understory vegetation provides cover and forage for wildlife. The characteristic understory plant community is mainly buckbrush and bluegrass.

The land capability classification is VIIe, nonirrigated.

**141—Dubakella stony loam, 30 to 50 percent slopes.** This moderately deep, well drained soil is on mountain spur ridges. It formed in residuum and colluvium derived from serpentinitic and other ultrabasic rocks. The native vegetation is mainly brush, hardwoods, and grass. Elevation is 2,500 to 3,500 feet. The average annual precipitation is 50 to 60 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 25 percent of the surface is partially covered with stones, cobbles, and gravel and with a 1-inch mat of needles, twigs, cones, and branches. The surface layer is reddish brown stony loam about 5 inches thick. The subsoil is yellowish red very cobbly clay loam and strong brown and yellowish red very cobbly clay about 29 inches thick. Fractured serpentinitic ultrabasic rock with clay films lining cracks is at a depth of about 34 inches. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of a deep gravelly or cobbly clay loam, Bamtush Variant

very gravelly loam, and Weitchpec Variant gravelly loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is slow in the Dubakella soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This soil is used for wood products or as wildlife habitat.

Oregon white oak and digger pine are the main tree species. This soil can produce 24 cords of wood per acre from a stand of trees that average 8 inches in diameter at a height of 4.5 feet.

The main limitations affecting the harvesting of wood products are the severe hazard of erosion, the slope, and the stones on the surface. The stoniness and the slope limit accessibility for cutting wood and for other activities involving the use of equipment. Roads and landings can be protected against erosion by constructing water bars. The characteristic understory plant community is mainly buckbrush, whiteleaf manzanita, greenleaf manzanita, lemon ceanothus, and California fescue. The understory vegetation provides cover and forage for wildlife.

The slope is a major concern if this soil is used for homesite development. Excessive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed.

The land capability classification is VIIe, nonirrigated.

**142—Etsel very gravelly loam, 30 to 50 percent slopes.** This shallow, somewhat excessively drained soil is on mountains. It formed in material weathered from sedimentary rocks. The native vegetation is mainly brush and grass. Elevation is 1,600 to 2,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 52 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 75 percent of the surface is partially covered with gravel and with a 2-inch mat of leaves and twigs. The surface layer is brown very gravelly loam about 4 inches thick. The underlying material to a depth of 14 inches is light brown and pink very gravelly loam. Fractured shale is at a depth of about 14 inches. The depth to bedrock ranges from 14 to 20 inches.

Included with this soil in mapping are small areas of Hoosimbim gravelly loam under conifers, Holkat Variant gravelly loam under dense hardwoods, and Brownbear very gravelly loam under conifers and hardwoods. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Etsel soil. Available water capacity is very low. The effective rooting depth is 14 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This soil is used as watershed, recreational areas, or wildlife habitat.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the moderate hazard of erosion, disturbance of the soil should be kept to a minimum. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads can be protected against erosion by constructing water bars and by other measures, such as seeding, mulching, and filter strips. The potential plant community is mainly whiteleaf manzanita, chaparral oak, greenleaf manzanita, other brush, and grasses. This vegetation provides food and cover for wildlife. The natural vegetation is mainly brush.

The slope is a major concern if this soil is used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. Septic tank absorption fields do not function properly because of the slope and the shallow depth of the soil.

The land capability classification is VIIe, nonirrigated.

**143—Etsel-Bamtush complex, 50 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly brush and grass on the Etsel soil and conifers, hardwoods, and brush on the Bamtush soil. Some areas have been burned and support mostly brush and hardwoods. Elevation is 2,300 to 4,000 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is 55 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 60 percent Etsel very gravelly loam and 20 percent Bamtush extremely gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Hoosimbim extremely gravelly sandy loam, Hotaw loam, and Rubble land. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Etsel soil is shallow and somewhat excessively drained. It formed in material weathered from sedimentary rocks. Typically, 75 percent of the surface is partially covered with gravel and with a 2-inch mat of leaves and twigs. The surface layer is brown very

gravelly loam about 4 inches thick. The underlying material to a depth of 14 inches is light brown and pink very gravelly loam. Fractured shale is at a depth of about 14 inches. The depth to bedrock ranges from 14 to 20 inches.

Permeability is moderate in the Etsel soil. Available water capacity is very low. The effective rooting depth is 14 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Bamtush soil is very deep and is well drained. It formed in colluvium and material weathered from sedimentary rocks. Typically, 30 percent of the surface is partially covered with gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is dark grayish brown and brown extremely gravelly loam about 6 inches thick. The upper 8 inches of the subsoil is yellowish brown very gravelly loam. The lower 53 inches is brown and reddish yellow very gravelly sandy clay loam.

Permeability is moderate in the Bamtush soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe.

The Etsel soil is used as watershed, recreational areas, or wildlife habitat. The Bamtush soil is used for timber production.

The careful management of watershed areas and of recreational areas and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the severe hazard of erosion, disturbance of the soil should be kept to a minimum. The potential plant community on the Etsel soil is mainly whiteleaf manzanita, chaparral oak, greenleaf manzanita, other brush, and grasses. This vegetation provides cover and forage for wildlife. The natural vegetation is mainly brush.

Douglas-fir, ponderosa pine, California black oak, sugar pine, and Pacific madrone are the main tree species on the Bamtush soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 123 for Douglas-fir on the Bamtush soil. The CACTOS 50-year site index for the Bamtush soil is 73.

The main concerns affecting the production and harvesting of timber on the Bamtush soil are the slope, the severe hazard of erosion, and the low available water capacity. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Careful management of reforestation is needed to reduce competition from undesirable understory plants. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Trees that are suitable for planting include Douglas-fir and ponderosa pine. If windrowing is considered in areas of this soil, care should be taken to avoid removal of the surface soil because nutrients are concentrated in the surface layer. The removal of the surface layer increases seedling mortality and reduces productivity. Constructing the windrows on the contour helps to prevent erosion resulting from the concentration of surface runoff. Extending the windrow piles completely across the cleared slope helps to catch the surface runoff. Erosion can be minimized by reducing the downslope distance between windrow piles. The characteristic understory plant community on the Bamtush soil is mainly deerbrush, snowberry, California hazel, Pacific madrone, and poison-oak. The understory vegetation provides cover and forage for wildlife.

The land capability classification is VIIe, nonirrigated.

**144—Etsel-Weitchpec complex, 50 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly brush, grass, and conifers. Elevation is 1,600 to 4,700 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 55 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 60 percent Etsel very gravelly loam and 20 percent Weitchpec gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Dubakella cobbly clay loam, 30 to 50 percent slopes; Dougcity gravelly loam, 50 to 75 percent slopes; and Xerofluvents along streams under woody streamside vegetation, such as willow and alder. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Etsel soil is shallow and somewhat excessively drained. It formed in material weathered from serpentinitic rocks. Typically, 60 percent of the surface is partially covered with gravel and cobbles and with a 1-inch mat of needles, leaves, and twigs. The surface layer is brown very gravelly loam about 6 inches thick. The underlying material to a depth of 17 inches is brown extremely gravelly loam. Fractured serpentinitic rock is at a depth of about 17 inches. The depth to

bedrock ranges from 14 to 20 inches.

Permeability is moderate in the Etsel soil. Available water capacity is very low. The effective rooting depth is 14 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Weitchpec soil is moderately deep and is well drained. It formed in material weathered from serpentinitic rocks. Typically, 15 percent of the surface is partially covered with gravel and cobbles and with a 1-inch mat of needles, leaves, and twigs. The surface layer and the subsoil are brown and light brown gravelly loam about 10 inches thick. The substratum to a depth of 29 inches is pink very gravelly loam. Fractured serpentinic rock is at a depth of about 29 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Weitchpec soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Etsel soil is used as watershed. The Weitchpec soil is used mainly for timber production. It is also used for homesite development on a limited basis.

If these soils are used for homesite development, the main limitations are the slope and the depth to bedrock. The slope is a major concern. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. Septic tank absorption fields do not function properly because of the slope and the shallow depth of the soils.

Careful management of watershed areas, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Most areas of the Etsel soil support less than 10 percent tree canopy. Vegetation consists of needlegrass, Idaho fescue, other grasses, buckbrush, digger pine, incense cedar, and shrub live oak. This vegetation provides cover and forage for wildlife. The natural vegetation is mainly brush. Because of the severe hazard of erosion, disturbance of the soil should be kept to a minimum.

Douglas-fir, incense cedar, digger pine, California black oak, and Jeffrey pine are the main tree species on the Weitchpec soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 81 for Douglas-fir. Because of the low basal area and extent of the main commercial species, yields commonly are only 80 percent of those of normal stands. The CACTOS 50-year site index for the Weitchpec soil is 57.

The main concerns affecting the production and harvesting of timber on the Weitchpec soil are the slope, the severe hazard of erosion, and a nutrient imbalance. The slope limits the kinds of equipment that can be used. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Careful management of reforestation is needed to reduce competition from undesirable understory plants. If reforestation is considered, species that are tolerant of serpentinitic soil conditions should be selected. Jeffrey pine is suitable for planting. The characteristic understory plant community on the Weitchpec soil is mainly buckbrush, California hazel, and greenleaf manzanita. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIIe, nonirrigated.

**145—Goulding-Holkat Variant-Marpa Variant complex, 50 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly hardwoods, grass, brush, and scattered conifers. Elevation is 1,900 to 3,500 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 30 percent Goulding very gravelly loam, 30 percent Holkat Variant clay loam, and 20 percent Marpa Variant gravelly clay loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Dubakella cobbly clay loam, 30 to 50 percent slopes; Tallowbox gravelly coarse sandy loam, 50 to 75 percent slopes, under conifers; Bamtush Variant very gravelly loam, 50 to 75 percent slopes, under conifers; Weitchpec Variant gravelly loam, 50 to 75 percent slopes, under conifers; and areas, under brush, of very gravelly clay loam that is 40 to 60 inches deep over bedrock. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Goulding soil is shallow and somewhat excessively drained. It formed in material weathered from metasedimentary rocks. Typically, 20 percent of the surface is partially covered with gravel and with a ½-inch mat of leaves, twigs, and grass stems. The surface layer is brown very gravelly loam about 6 inches thick. The subsoil is dark yellowish brown extremely gravelly loam about 7 inches thick. Fractured bedrock is at a depth of about 13 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Goulding soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and

the hazard of water erosion is severe.

The Holkat Variant soil is moderately deep and is well drained. It formed in material weathered from metasedimentary rocks. Typically, the surface layer is light brownish gray clay loam about 11 inches thick. The subsoil is pale brown gravelly clay loam about 12 inches thick. Metasedimentary rock is at a depth of about 23 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Holkat Variant soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Marpa Variant soil is moderately deep and is well drained. It formed in material weathered from metasedimentary rocks. Typically, the surface is partially covered with a ½-inch mat of needles, leaves, twigs, and limbs. The surface layer is light brownish gray gravelly clay loam about 10 inches thick. The upper 9 inches of the subsoil is brown very cobbly clay loam. The lower 17 inches is light reddish brown very cobbly clay. Fractured metamorphosed shale is at a depth of about 36 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is slow in the Marpa Variant soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used as watershed. The Goulding and Holkat Variant soils are used for wood products, and the Marpa Variant soil is used for timber production.

Careful management of watershed areas, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the severe hazard of erosion, disturbance of the soil should be kept to a minimum. In areas where the Goulding soil supports a canopy of trees, canyon live oak, Oregon white oak, and digger pine are the main species. The Goulding soil can produce 23 cords of wood per acre that average 7 inches in diameter at a height of 4.5 feet. Some areas of the Goulding soil support less than 10 percent tree canopy. Vegetation consists of canyon live oak, buckbrush, birchleaf mountainmahogany, greenleaf manzanita, digger pine, Lemmon needlegrass, and annual grasses. This vegetation provides food and cover for wildlife.

Oregon white oak, California black oak, digger pine, and scattered ponderosa pine are the main tree species on the Holkat Variant soil. This soil can produce 33 cords of wood per acre from a stand of trees that average 11 inches in diameter at a height of 4.5 feet. The characteristic understory plant community on this soil is mainly buckbrush, birchleaf mountainmahogany, California fescue, and silver hairgrass.

Ponderosa pine, Oregon white oak, California black oak, Douglas-fir, and canyon live oak are the main tree species on the Marpa Variant soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 83 for ponderosa pine on this soil. The CACTOS 50-year site index for the Marpa Variant soil is 54.

The main concerns affecting the production and harvesting of timber on the Marpa Variant soil are the severe hazard of erosion and the slope. The Marpa Variant soil also is limited by the low available water capacity in the surface layer. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope limits the kinds of equipment that can be used and restricts the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Ponderosa pine is suitable for planting on the Marpa Variant soil. The characteristic understory plant community on this soil is mainly buckbrush, needlegrass, native rose, shrub live oak, and silver hairgrass. The understory vegetation provides cover and forage for wildlife.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. Septic tank absorption fields do not function properly because of the slope and the shallow depth of the Goulding soil.

The land capability classification is VIIe, nonirrigated.

**146—Goulding-Vitzthum-Vanvor complex, 50 to 75 percent slopes.** This map unit occurs mostly on south-facing mountain slopes. Areas are dissected by perennial streams. The native vegetation is mainly brush, hardwoods, conifers, and grass. Elevation is 1,700 to 4,200 feet. The average annual precipitation is 30 to 60 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 30 percent Goulding very gravelly loam, 25 percent Vitzthum extremely gravelly loam, and 20 percent Vanvor very gravelly sandy clay loam. The three soils occur as areas so intricately intermingled

that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Brownbear very gravelly loam, Hoosimbim extremely gravelly sandy loam, Marpa very gravelly sandy clay loam, and Sheetiron very gravelly loam. These included soils are all under mixed conifers. Also included are small areas of a deep gravelly loam that has a thick, dark surface horizon; terraces; and areas of Xerofluvents and Riverwash along stream channels under woody streamside vegetation. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Goulding soil is shallow and somewhat excessively drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, 20 percent of the surface is partially covered with gravel and with a ½-inch mat of leaves and a few twigs and grass stems. The surface layer is brown very gravelly loam about 6 inches thick. The subsoil is dark yellowish brown extremely gravelly loam about 7 inches thick. Fractured metavolcanic rock is at a depth of about 13 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Goulding soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Vitzthum soil is shallow and somewhat excessively drained. It formed in colluvium and material weathered from metavolcanic rock. Typically, 75 percent of the surface is partially covered with gravel and with a 1-inch mat of leaves and twigs. The surface layer is dark yellowish brown extremely gravelly loam about 3 inches thick. The subsoil is brown or strong brown extremely gravelly sandy clay loam about 14 inches thick. Fractured hard metavolcanic rock is at a depth of about 17 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Vitzthum soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Vanvor soil is moderately deep and is well drained. It formed in residuum and colluvium derived from metavolcanic rock. Typically, 30 percent of the surface is partially covered with fine gravel and with a 1-inch mat of leaves, twigs, and needles. The surface layer is brown very gravelly sandy clay loam about 6 inches thick. The upper 18 inches of the subsoil is strong brown very gravelly sandy clay loam and very gravelly clay loam. The lower 7 inches is strong brown extremely gravelly clay loam. Fractured schist is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Vanvor soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used as watershed, recreational areas, or wildlife habitat.

Careful managment of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the severe hazard of erosion, disturbance of the soil should be kept to a minimum. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars and by using other methods, such as seeding, mulching, and filter strips.

In areas where the Goulding soil supports a canopy of trees, the main species are canyon live oak, Oregon white oak, and digger pine. The Goulding soil can produce 23 cords of wood per acre from a stand of trees that average 7 inches in diameter at a height of 4.5 feet. Some areas of this soil support less than 10 percent tree canopy. In these areas the potential plant community is mainly canyon live oak, buckbrush, birchleaf mountainmahogany, greenleaf manzanita, digger pine, Lemmon needlegrass, and annual grasses. This vegetation provides food and cover for wildlife.

The Vitzthum soil produces vegetation that provides cover and forage for wildlife. The potential plant community is mainly greenleaf manzanita, canyon live oak, birchleaf mountainmahogany, and grasses.

In areas where the Vanvor soil supports a canopy of trees, the main species are Oregon white oak, canyon live oak, and digger pine. The Vanvor soil can produce 57 cords of wood per acre from a stand of trees that average 9 inches in diameter at a height of 4.5 feet. Some areas of this soil support less than 10 percent tree canopy. Vegetation provides food and cover for wildlife. Woody streamside vegetation also provides important habitat for wildlife.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. Septic tank absorption fields do not function properly because of the slope and the shallow depth of the Goulding and Vitzthum soils. Because rock fragments and loose soil material may slide down from roadcuts in areas of this unit, the need for road maintenance may be increased.

The land capability classification is VIIe, nonirrigated.

**147—Haploxerolls, warm, 0 to 2 percent slopes.** These very deep, well drained soils are on stream terraces. They formed in alluvium derived from mixed rock sources. Areas are adjacent to perennial streams. The native vegetation is mainly grasses and scattered conifers, hardwoods, and brush. Elevation is 1,600 to 2,350 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 52 to 57 degrees F, and the average frost-free period is 90 to 130 days.

A reference pedon of Haploxerolls has a surface layer of brown fine sandy loam about 7 inches thick. The upper 37 inches of the underlying material also is brown fine sandy loam. The lower part to a depth of 68 inches or more is variegated white and grayish brown coarse sand.

These soils are variable. In some areas the underlying material is brown extremely cobbly fine sandy loam or extremely cobbly loamy fine sand. The areas that are underlain by extremely cobbly material are in convex sloping areas of the stream terraces. These areas are old gravel bars.

Included in mapping are small areas of Xerofluvents and Riverwash along stream channels under woody streamside vegetation, such as willow and alder; Haysum gravelly loam, 2 to 5 percent slopes; and Carrcreek gravelly loam, 2 to 5 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately rapid or rapid in the Haploxerolls. Available water capacity is low or moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for homesite development or as pasture.

If the areas that are underlain by extremely cobbly material are used for homesite development, the main limitations are the rapid permeability and the coarse texture. Because of the rapid permeability, seepage from onsite sewage disposal systems may contaminate water supplies. Cutbanks are subject to caving. Providing excavations with sloped banks or shoring the excavations helps to keep the cutbanks from caving in. During periods of heavy rainfall, these soils are subject to ponding. Proper grading is needed to divert water away from homesites.

If these soils are used as pasture, the main limitations are the low available water capacity and the rapid permeability in the areas underlain by extremely cobbly material. Under optimum management and weather conditions, areas used as irrigated pastureland can produce about 8 animal unit months per acre per year. Because some areas of these soils are droughty, applications of irrigation water should be light and frequent.

Streamside vegetation provides important habitat for wildlife.

The land capability classification is IVs-4, irrigated and nonirrigated.

**148—Haploxerolls, 2 to 9 percent slopes.** These very deep, well drained soils are on alluvial fans and stream terraces. They formed in alluvium and colluvium derived from granitic rock sources. They are adjacent to perennial streams. The native vegetation is mainly conifers, hardwoods, and brush. Elevation is 2,000 to 4,500 feet. The average annual precipitation is 45 to 50 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

In a reference pedon, the surface is covered with a 2-inch mat of needles, leaves, and twigs. The surface layer is grayish brown fine gravelly coarse sandy loam about 10 inches thick. The underlying material, to a depth of 44 inches, is light brownish gray fine gravelly coarse sandy loam. Below this to a depth of 60 inches or more is a buried surface layer of dark grayish brown fine gravelly coarse sandy loam.

Included in mapping are small areas of Minersville sandy loam, 30 to 50 percent slopes; Tallowbox gravelly coarse sandy loam, 30 to 50 percent slopes; Valcreek fine gravelly loamy coarse sand, 30 to 75 percent slopes; and Minersville Variant fine gravelly loamy coarse sand, 50 to 75 percent slopes. The included soils are on mountain slopes. Also included are small areas of Xerofluvents and Riverwash along stream channels under woody streamside vegetation and areas used as paved roadways on cuts and fills. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately rapid or rapid in the Haploxerolls. Available water capacity is low or moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for timber production or homesite development.

Douglas-fir, ponderosa pine, sugar pine, and white alder are the main tree species on these soils. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 138 for Douglas-fir. Because of the variable nature of the soils, the site index and the annual production are also variable. The CACTOS 50-year site index is 93.

Few limitations affect the harvesting and production of timber. These soils are in areas adjacent to perennial stream channels. Disturbances in these areas can

cause severe streambank erosion. Also, these areas have high surface runoff from areas upslope, and disturbances that expose bare soil can cause gullying. Minimizing the hazard of erosion is essential when timber is harvested. Seasonal snowpack limits the use of equipment and restricts access. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars and by seeding fills. Straw mulching also is effective. After harvesting, carefully managed reforestation helps to control competition from undesirable understory plants. Trees that are suitable for planting include Douglas-fir, ponderosa pine, and sugar pine. The characteristic understory plant community is mainly poison-oak, shrub live oak, brackenfern, and horsetail. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

If the areas that are underlain by extremely cobbly material are used for homesite development, the main limitations are the rapid permeability and the coarse texture. Because of the rapid permeability, seepage from onsite sewage disposal systems may contaminate water supplies. Cutbanks are subject to caving. Providing excavations with sloped banks or shoring the excavations helps to prevent the cutbanks from caving in. During periods of heavy rainfall, these soils are subject to ponding. Proper grading is needed to divert water away from homesites.

The land capability classification is IVe-4, nonirrigated.

**149—Haysum loam, 5 to 9 percent slopes.** This very deep, well drained soil is on alluvial fans. It formed in alluvium from granitic rock sources. The native vegetation is mainly grasses and scattered hardwoods and conifers. Elevation is 1,900 to 2,100 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 55 to 57 degrees F, and the average frost-free period is 90 to more than 130 days.

Typically, the surface layer is brown loam about 15 inches thick. The subsoil and the substratum to a depth of 60 inches or more are brown or yellowish brown clay loam and gravelly loam.

Included with this soil in mapping are small areas of poorly drained clay loam; soils under marsh grasses and reeds in concave areas and depressions where small springs reach the surface; Hotaw loam, 15 to 30 percent slopes; Minersville sandy loam, 30 to 50 percent slopes; and Tallowbox fine gravelly coarse sandy loam, 30 to 50 percent slopes. Also included are small areas of very deep very gravelly loam and areas where the soils have been disturbed by cutting and filling during homesite and road development. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Haysum soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight.

This soil is used for homesite development or as pasture.

Few limitations affect the use of this soil for homesite development. The hazard of erosion is increased if the soil is left exposed during site development. Temporary erosion-control measures may be necessary. Straw mulching and seeding help to control erosion. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. The design of access roads should provide stable cut and fill slopes, and drains are needed to control surface runoff and keep soil losses to a minimum. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Adapted species should be selected for planting when lawns, shrubs, trees, and vegetable gardens are established. Structures that divert runoff are needed if buildings and roads are constructed.

Few limitations affect the use of this soil as pasture. Under optimum management and weather conditions, areas used as irrigated pastureland can produce about 9 animal unit months per acre per year and areas used as nonirrigated pastureland can produce 5 animal unit months per acre per year.

Marsh vegetation provides habitat for wildlife.

The land capability classification is IIIe-1, irrigated and nonirrigated.

**150—Haysum gravelly loam, 0 to 2 percent slopes.** This very deep, well drained soil is on stream terraces and alluvial fans. It formed in alluvium from mixed rock sources. The vegetation in areas that have not been cultivated or cleared is mainly oaks, brush, grasses, and forbs and scattered clumps of oaks mixed with conifers. Historically, the Haysum soil was covered with a light, uneven canopy of Oregon white oak and ponderosa pine. Elevation is 2,200 to 2,600 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface layer is brown gravelly loam about 15 inches thick. The upper 51 inches of the subsoil is yellowish brown gravelly clay loam. The lower

5 inches is yellowish brown very gravelly sandy clay loam.

Included with this soil in mapping are small areas of Carrcreek gravelly loam and areas of a very deep gravelly loam underlain by rapidly permeable very gravelly sand near stream channels. Also included, near Highway 3 along Big Creek, are small areas of a very deep gravelly loam in which the water table is at a depth of 40 to 60 inches; Crefork loam, 9 to 15 percent slopes, on hills under oaks; and Jafa loam under conifers on terraces. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Haysum soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This soil is used for pastureland, hayland, or homesite development.

Few limitations affect the use of this soil as pastureland or hayland. Under optimum management and weather conditions, areas used as irrigated pastureland can produce about 8 animal unit months per acre per year and areas used as nonirrigated pastureland can produce 3 animal unit months per acre per year. Areas used as irrigated hayland can produce about 4 tons of grass hay per acre per year, and areas used as nonirrigated hayland can produce 1.25 tons. Irrigated areas can also produce 3 tons of alfalfa per acre per year (fig. 3).

Few limitations affect the use of this soil for homesite or urban development. The removal of gravel and cobbles in disturbed areas is needed for landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants.

The land capability classification is IIIs-1, irrigated and nonirrigated.

**151—Haysum gravelly loam, 2 to 5 percent slopes.** This very deep, well drained soil is on stream terraces and alluvial fans. It formed in alluvium from mixed rock sources. The vegetation in areas that have not been cultivated or cleared is mainly oaks, brush, grasses, and forbs and scattered clumps of oaks mixed with conifers. Historically, the Haysum soil was covered with a light, uneven canopy of Oregon white oak and ponderosa pine. Elevation is 2,200 to 2,600 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface layer is brown gravelly loam about 15 inches thick. The upper 51 inches of the subsoil is yellowish brown gravelly clay loam. The lower 5 inches is yellowish brown very gravelly sandy clay loam.

Included with this soil in mapping are small areas of Carrcreek gravelly loam and areas of a very deep gravelly loam that is underlain by rapidly permeable very gravelly sand near stream channels. Also included are small areas of Crefork loam, 9 to 15 percent slopes, on hills under oaks and Jafa loam under conifers on terraces. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Haysum soil. Available water capacity is moderate or high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This soil is used for pastureland, hayland, or homesite development.

Few limitations affect the use of this soil as pastureland or hayland. Under optimum management and weather conditions, areas used as irrigated pastureland can produce about 8 animal unit months per acre per year and areas used as nonirrigated pastureland can produce 3 animal unit months per acre per year. Areas used as irrigated hayland can produce about 4 tons of grass hay per acre per year, and areas used as nonirrigated hayland can produce 1.25 tons. Irrigated areas can also produce 3 tons of alfalfa per acre per year.

Few limitations affect the use of this soil for homesite or urban development. The removal of gravel and cobbles in disturbed areas is needed for landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants.

The land capability classification is IIIe-1, irrigated and nonirrigated.

**152—Haysum gravelly loam, 5 to 9 percent slopes.** This very deep, well drained soil is on alluvial fans. It formed in alluvium from mixed rock sources. Areas are adjacent to perennial streams. The vegetation in areas that have not been cultivated is mainly grasses and scattered brush, hardwoods, and conifers. Elevation is 1,550 to 2,100 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 52 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface is partially covered with a 1-inch mat of grass stems. The surface layer is strong brown gravelly loam about 15 inches thick. The subsoil to a depth of 60 inches or more is strong brown gravelly clay loam.

Included with this soil in mapping are small areas of Brownscreek gravelly loam, 30 to 50 percent slopes,

**Figure 3.—Irrigated alfalfa on Haysum gravelly loam, 0 to 2 percent slopes, in the Hayfork Valley.**

under mixed conifers; Xerofluvents and Riverwash along stream channels under woody streamside vegetation, such as willow and alder; Dumps, dredge tailings; areas that have slopes of more than 9 percent; Hotaw loam, 15 to 30 percent slopes, under mixed conifers; and areas of very gravelly loam that is less than 20 inches deep to broken bedrock in an area near Henrietta Road in Lewiston. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Haysum soil. Available water capacity is moderate or high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This soil is used for pastureland, hayland, or homesite development.

Few limitations affect the use of this soil as pastureland or hayland. Under optimum management and weather conditions, areas used as irrigated pastureland can produce about 8 animal unit months per acre per year and areas used as nonirrigated pastureland can produce 3 animal unit months per acre per year. Areas used as irrigated hayland can produce about 4 tons of grass hay per acre per year, and areas used as nonirrigated hayland can produce 1.25 tons.

Few limitations affect the use of this soil for homesite or urban development. The removal of gravel and cobbles in disturbed areas is needed for landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. The design of access roads should provide stable cut and fill slopes, and drains are needed to control surface runoff and keep soil losses to a minimum.

Streamside vegetation provides important habitat for wildlife.

The land capability classification is IIIe-1, irrigated and nonirrigated.

**153—Holkat-Hoosimbim complex, 30 to 50 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly mixed conifers. Elevation is 1,900 to 3,500 feet. The average annual precipitation is 35 to 65 inches, the average annual air temperature is 45 to 51 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Holkat loam and 35 percent Hoosimbim gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Goulding very gravelly loam under grasses, canyon live oak, and conifers; areas of a deep gravelly loam; Bamtush Variant very gravelly loam; and Weitchpec Variant gravelly loam. These included soils are on mountain slopes. Also included are small areas of Xerofluvents and Riverwash along stream channels under woody streamside vegetation, areas of a very deep very gravelly loam on slopes of less than 9 percent, and areas used as paved roadways on cuts and fills. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Holkat soil is moderately deep and is well drained. It formed in residuum and colluvium derived from metasedimentary rocks. Typically, the surface layer is brown loam about 3 inches thick. The subsoil is light yellowish brown gravelly loam about 7 inches thick. The substratum is light brown gravelly loam about 25 inches thick. Weathered metasedimentary bedrock is at a depth of about 35 inches. The depth to weathered bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Holkat soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Hoosimbim soil is deep and well drained. It formed in residuum and colluvium derived from metavolcanic and basic intrusive rocks. Typically, the surface layer is yellowish brown gravelly loam about 4 inches thick. The upper 12 inches of the subsoil is brown and light brown very gravelly sandy clay loam. The lower 26 inches is reddish yellow extremely gravelly sandy clay loam. Fractured metavolcanic rock is at a depth of about 42 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderate in the Hoosimbim soil. Available water capacity is low or moderate. The effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for timber production.

Douglas-fir, California black oak, white fir, sugar pine, and Pacific dogwood are the main tree species on the Holkat soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 87 for Douglas-fir on the Holkat soil. The CACTOS 50-year site index for the Holkat soil is 58.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and Pacific madrone are the main tree species on the Hoosimbim soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 102 for Douglas-fir on the Hoosimbim soil. The CACTOS 50-year site index for the Hoosimbim soil is 66.

The main concerns affecting the production and harvesting of timber are the severe hazard of erosion, the slope, and the low available water capacity. The slope limits the kinds of equipment that can be used. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. Trees that are suitable for planting include Douglas-fir and ponderosa pine. The characteristic understory plant community on the Holkat soil is mainly gooseberry, needlegrass, brackenfern, and California hazel. The characteristic understory plant community on the Hoosimbim soil is mainly California hazel, poison-oak, snowberry, shrub live oak, whitethorn ceanothus, and squawcarpet. Understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIe, nonirrigated.

**154—Holkat-Hoosimbim complex, 50 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly mixed conifers. Elevation is 1,900 to 4,500 feet. The average annual precipitation is 35 to 65 inches, the average annual air temperature is 45 to 51 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 50 percent Holkat loam and 30 percent Hoosimbim gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of a deep gravelly loam; areas of a very deep very gravelly loam; Goulding very gravelly loam under grass, canyon live oak, and conifers; Rock outcrop on ridgetops; and areas of Rubble land. Also included are small areas of Xerofluvents and Riverwash along stream channels under woody streamside vegetation

and areas used as paved roadways on cuts and fills. Some areas have been disturbed by their use as haul roads, landings, and skid trails. Rills and gullies have formed where runoff has concentrated. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Holkat soil is moderately deep and is well drained. It formed in residuum and colluvium derived from metasedimentary rocks. Typically, the surface layer is brown loam about 3 inches thick. The subsoil is light yellowish brown gravelly loam about 7 inches thick. The substratum is light brown gravelly loam about 25 inches thick. Weathered metasedimentary rock is at a depth of about 35 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Holkat soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Hoosimbim soil is deep and well drained. It formed in residuum and colluvium derived from metavolcanic and basic intrusive rocks. Typically, the surface layer is yellowish brown gravelly loam about 4 inches thick. The upper 12 inches of the subsoil is brown and light brown very gravelly sandy clay loam. The lower 26 inches is reddish yellow extremely gravelly sandy clay loam. Fractured metavolcanic rock is at a depth of about 42 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderate in the Hoosimbim soil. Available water capacity is low or moderate. The effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for timber production.

Douglas-fir, California black oak, white fir, sugar pine, and Pacific dogwood are the main tree species on the Holkat soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 87 for Douglas-fir on the Holkat soil. The CACTOS 50-year site index for the Holkat soil is 58.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and Pacific madrone are the main tree species on the Hoosimbim soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 102 for Douglas-fir on the Hoosimbim soil. The CACTOS 50-year site index for the Hoosimbim soil is 66.

The main concerns affecting the production and harvesting of timber are the severe hazard of erosion, the slope, and the low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Seasonal snowpack limits the use of equipment and restricts access. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Trees that are suitable for planting include Douglas-fir and ponderosa pine. The characteristic understory plant community on the Holkat soil is mainly gooseberry, needlegrass, brackenfern, and California hazel. The characteristic understory plant community on the Hoosimbim soil is mainly California hazel, poison-oak, snowberry, shrub live oak, whitehorn ceanothus, and squawcarpet. Understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIIe, nonirrigated.

**155—Holkat Variant-Dedrick association, 50 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly dense hardwood thickets and brush on the Holkat Variant soil and grass, brush, and scattered hardwoods and conifers on the Dedrick soil. Elevation is 1,500 to 4,000 feet. The average annual precipitation is 30 to 40 inches, and the average frost-free period is 90 to 130 days. The average annual air temperature is 50 to 57 degrees F in areas of the Holkat Variant soil and 57 to 63 degrees F in areas of the Dedrick soil.

This unit is 40 percent Holkat Variant gravelly loam and 35 percent Dedrick very gravelly loam. The Holkat Variant soil is mostly on north-facing slopes, and the Dedrick soil is mostly on south-facing slopes.

Included with these soils in mapping are small areas of Brockgulch very gravelly loam under canyon live oak on south-facing slopes; Rock outcrop; Pardaloe gravelly loam under Douglas-fir and oaks on north-facing slopes; and areas of a deep gravelly clay loam under Douglas-fir and oaks on north-facing slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Holkat Variant soil is moderately deep and is well drained. It formed in material weathered from metavolcanic rocks. Typically, 5 percent of the surface is partially covered with gravel. The surface layer is brown gravelly loam about 5 inches thick. The upper 30 inches of the subsoil is strong brown gravelly loam. The lower 3 inches is strong brown very gravelly loam. Fractured schist is at a depth of about 38 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Holkat Variant soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Some roots penetrate to a greater depth by following fractures in the bedrock. Runoff is very rapid, and the hazard of water erosion is severe.

The Dedrick soil is shallow and somewhat excessively drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, 60 percent of the surface is partially covered with gravel and 10 percent is covered with cobbles. The surface layer is dark yellowish brown very gravelly loam about 3 inches thick. The subsoil is yellowish brown extremely gravelly loam about 12 inches thick. Fractured schist is at a depth of about 15 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Dedrick soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used as watershed or for wood products.

Careful management of watershed areas is needed to keep erosion to a minimum and to maintain the quality of the runoff.

Oregon white oak, California black oak, and digger pine are the main tree species on the Holkat Variant soil. This soil can produce 22 cords of wood per acre from a stand of trees that average 4 inches in diameter at a height of 4.5 feet. The characteristic understory plant community on this soil is mainly poison-oak, redbud, greenleaf manzanita, and birchleaf mountainmahogany. Understory vegetation provides cover and forage for wildlife.

If the Holkat Variant soil is used for wood products, the main concerns affecting the harvesting of wood are the slope and the severe hazard of erosion. The slope limits the use of wheeled and tracked equipment in skidding operations. Maintaining the understory vegetation is essential for the control of erosion. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars and by using other methods, such as seeding, mulching, and filter strips where necessary.

Most areas of the Dedrick soil support less than 10 percent tree canopy. Vegetation consists of buckbrush, birchleaf mountainmahogany, soft chess, and scattered canyon live oak and digger pine. This vegetation provides food and cover for wildlife. In areas where the Dedrick soil supports a canopy of trees, canyon live oak and digger pine are the main species. This soil can produce 24 cords of wood per acre from a stand of trees that average 10 inches in diameter at a height of 4.5 feet where the canopy is greater than 10 percent. The natural vegetation is mainly brush.

The land capability classification is VIIe, nonirrigated.

**156—Hoosimbim gravelly loam, 30 to 50 percent slopes.** This deep, well drained soil is on hills. It formed in material weathered from weakly consolidated conglomerate. The native vegetation is mainly conifers, hardwoods, and brush. Elevation is 2,500 to 3,000 feet. The average annual precipitation is 35 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface is partially covered with a 3-inch mat of leaves, bark, needles, and twigs. The surface layer is yellowish brown gravelly loam about 5 inches thick. The subsurface layer is brown gravelly loam about 8 inches thick. The subsoil is brown very gravelly clay loam about 29 inches thick. Weakly consolidated conglomerate is at a depth of about 42 inches. The depth to soft bedrock ranges from 40 to 60 inches.

Included with this soil in mapping are small areas of Crefork clay loam, 15 to 30 percent slopes, under grasses and oaks; areas of a moderately deep very gravelly clay loam under brush on hills; and Jafa loam on terraces. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately slow in the Hoosimbim soil. Available water capacity is low. The effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is severe.

This soil is used for timber production or homesite development.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and Pacific madrone are the main tree species on this soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 102 for Douglas-fir. The CACTOS 50-year site index is 62.

The main concerns affecting the production and harvesting of timber are the slope, the severe hazard of erosion, and the low available water capacity. The slope limits the kinds of equipment that can be used. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Careful management of reforestation is needed to reduce competition from undesirable understory plants. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing

slopes. Trees that are suitable for planting include Douglas-fir and ponderosa pine. The characteristic understory plant community is mainly California hazel, poison-oak, snowberry, shrub live oak, whitethorn ceanothus, and squawcarpet. The understory vegetation provides cover and forage for wildlife.

If this soil is used for homesite development, the main concerns are the slope, the severe hazard of erosion, and the restricted permeability. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Plans for homesite development should provide for the preservation of as many trees as possible. The removal of gravel and cobbles in disturbed areas is needed for landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. If the soil is used as a site for septic tank absorption fields, the restricted permeability can be overcome by increasing the size of the absorption field. The slope also is a concern. Absorption lines should be installed on the contour. The design of access roads should provide stable cut and fill slopes, and drains are needed to control surface runoff and keep soil losses to a minimum.

The land capability classification is VIe, nonirrigated.

**157—Hoosimbim-Bamtush-Marpa complex, 30 to 50 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly conifers, hardwoods, and brush. Elevation is 2,500 to 4,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 45 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 35 percent Hoosimbim extremely gravelly sandy loam, 25 percent Bamtush extremely gravelly loam, and 25 percent Marpa very gravelly sandy clay loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Caris extremely gravelly sandy loam, 50 to 75 percent slopes; Dubakella cobbly clay loam under sparse conifers and brush; and Indleton extremely gravelly sandy loam, 50 to 75 percent slopes. Also included are small areas of Hoosimbim, Bamtush, and Marpa soils that have slopes of more than 50 percent and Xerofluvents along drainageways under woody streamside vegetation, such as alder and willow. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Hoosimbim soil is deep and well drained. It formed in residuum and colluvium derived from metavolcanic rocks and some metasedimentary rocks. Typically, 50 percent of the surface is partially covered with angular gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is yellowish brown extremely gravelly sandy loam about 4 inches thick. The upper 12 inches of the subsoil is brown and light brown very gravelly sandy clay loam. The lower 26 inches is reddish yellow extremely gravelly sandy clay loam. Fractured metavolcanic rock is at a depth of 42 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderate in the Hoosimbim soil. Available water capacity is very low or low. The effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Bamtush soil is very deep and is well drained. It formed in residuum and colluvium derived from metavolcanic rocks and some metasedimentary rocks. Typically, 30 percent of the surface is partially covered with gravel and cobbles and with a 2-inch mat of needles, leaves, twigs, and cones. The surface layer is dark grayish brown and brown extremely gravelly loam about 6 inches thick. The upper 8 inches of the subsoil is yellowish brown very gravelly loam. The lower 53 inches is brown and reddish yellow very gravelly sandy clay loam.

Permeability is moderate in the Bamtush soil. Available water capacity is low. The effective rooting depth is more than 60 inches. Runoff is rapid. And the hazard of water erosion is moderate.

The Marpa soil is moderately deep and is well drained. It formed in residuum and colluvium derived from metavolcanic and metasedimentary rocks. Typically, 60 percent of the surface is partially covered with gravel and with scattered leaves and twigs. The surface layer is brown very gravelly sandy clay loam about 3 inches thick. The subsoil is brown and strong brown very gravelly clay loam and extremely gravelly clay loam about 28 inches thick. Fractured metamorphic bedrock is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Marpa soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used for timber production.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and Pacific madrone are the main tree species on the Hoosimbim soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 102 for Douglas-fir on the Hoosimbim soil.

The CACTOS 50-year site index for the Hoosimbim soil is 66.

Douglas-fir, ponderosa pine, California black oak, sugar pine, Pacific madrone, and canyon live oak are the main tree species on the Bamtush soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 123 for Douglas-fir on the Bamtush soil. The CACTOS 50-year site index for the Bamtush soil is 73.

Ponderosa pine, Douglas-fir, sugar pine, canyon live oak, and California black oak are the main tree species on the Marpa soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 63 for ponderosa pine on the Marpa soil. It is 78 for Douglas-fir (McArdle and Meyer, 1961). The CACTOS 50-year site index for the Marpa soil is 47.

The main concerns affecting the production and harvesting of timber are the moderate hazard of erosion, the slope, and the low or very low available water capacity. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope limits the kinds of equipment that can be used. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. If windrowing is considered on the Marpa soil, care should be taken to avoid removal of the upper part of the surface layer because the soil is moderately deep over bedrock and has nutrients concentrated in the thin surface layer. The removal of the surface layer increases the seedling mortality rate and reduces productivity. Constructing the windrows on the contour helps to prevent erosion resulting from surface runoff. Extending the windrow piles entirely across the cleared slope helps to catch the surface runoff. Erosion can be minimized by reducing the downslope distance between windrow piles. Ponderosa pine is suitable for planting on the Marpa soil and on the south slopes of the Bamtush and Hoosimbim soils. Douglas-fir and ponderosa pine are suitable for planting on the north slopes of the Bamtush and Hoosimbim soils. The understory vegetation provides cover and forage for wildlife. The characteristic understory plant community is mainly canyon live oak and California hazel on the Bamtush and Marpa soils and deerbrush and poison-oak on the Hoosimbim soil.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. The installation and functioning of septic tank absorption fields are limited by the slope.

The land capability classification is VIe, nonirrigated.

**158—Hoosimbim-Etsel complex, 30 to 50 percent slopes.** This map unit is on mountains. The native vegetation is mainly mixed conifers and hardwoods on the Hoosimbim soil and brush and grass on the Etsel soil. Elevation is 1,550 to 3,000 feet. The average annual precipitation is 35 to 50 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Hoosimbim gravelly loam and 35 percent Etsel very gravelly loam. The Etsel soil is mostly on spur ridgetops. The Hoosimbim and Etsel soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Holkat Variant gravelly loam, Bamtush extremely gravelly loam, and Brownbear very gravelly loam under conifers and hardwoods. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Hoosimbim soil is deep and well drained. It formed in material weathered from metasedimentary rocks. Typically, 50 percent of the surface is partially covered with angular gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is yellowish brown extremely gravelly sandy loam about 4 inches thick. The upper 12 inches of the subsoil is brown and light brown very gravelly sandy clay loam. The lower 26 inches is reddish yellow extremely gravelly sandy clay loam. Fractured metasedimentary rock is at a depth of about 42 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderate in the Hoosimbim soil. Available water capacity is very low or low. The effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Etsel soil is shallow and somewhat excessively drained. It formed in material weathered from sedimentary rocks. Typically, 75 percent of the surface is partially covered with gravel and with a 2-inch mat of leaves and twigs mixed with gravel. The surface layer is brown very gravelly loam about 4 inches thick. The underlying material is light brown and pink very gravelly loam about 10 inches thick. Fractured shale bedrock is at a depth of about 14 inches. The depth to bedrock ranges from 14 to 20 inches.

Permeability is moderate in the Etsel soil. Available

water capacity is very low. The effective rooting depth is 14 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Hoosimbim soil is used for timber production, and the Etsel soil is used as watershed, recreational areas, or wildlife habitat.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and Pacific madrone are the main tree species on the Hoosimbim soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 102 for Douglas-fir on the Hoosimbim soil. The CACTOS 50-year site index for the Hoosimbim soil is 66.

The main concerns affecting the production and harvesting of timber on the Hoosimbim soil are the hazard of erosion, the slope, the low or very low available water capacity, and the gravel on the surface. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope limits the kinds of equipment that can be used. Careful management of reforestation is needed to reduce competition from undesirable understory plants. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Douglas-fir and ponderosa pine are suitable for planting on the north slopes, and ponderosa pine is suitable on the south slopes. The characteristic understory plant community on the Hoosimbim soil is mainly deerbrush, California hazel, poison-oak, and shrub live oak. The understory vegetation provides cover and forage for wildlife.

Careful management of watershed areas, recreational areas, and wildlife habitat is needed to keep erosion to a minimum and to maintain the quality of the runoff. Because of the hazard of erosion on the Etsel soil, disturbance of the soil should be kept to a minimum. The potential plant community on the Etsel soil is mainly whiteleaf manzanita, chaparral oak, greenleaf manzanita, other brush, and grasses. This vegetation provides cover and forage for wildlife. The natural vegetation is mainly brush.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. The installation and functioning of septic tank absorption fields are severely limited by the slope and the shallow depth to bedrock in areas of the Etsel soil.

The land capability classification is VIe, nonirrigated.

**159—Hoosimbim-Goulding complex, 50 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly conifers on the Hoosimbim soil and hardwoods, brush, and grass on the Goulding soil. Elevation is 2,500 to 3,700 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is 45 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 60 percent Hoosimbim extremely gravelly sandy loam and 20 percent Goulding very gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Indleton extremely gravelly sandy loam under conifers; areas of a moderately deep gravelly clay loam under grass, brush, and oaks; and Xerofluvents and Riverwash along stream channels under woody streamside vegetation. Also included are small areas of a moderately deep gravelly sandy clay loam that has a thick, dark surface layer. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Hoosimbim soil is deep and well drained. It formed in residuum and colluvium derived from metavolcanic rocks and some metasedimentary rocks. Typically, 50 percent of the surface is partially covered with gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is yellowish brown extremely gravelly sandy loam about 4 inches thick. The upper 12 inches of the subsoil is brown and light brown very gravelly sandy clay loam. The lower 26 inches is reddish yellow extremely gravelly sandy clay loam. Fractured metavolcanic rock is at a depth of about 42 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderate in the Hoosimbim soil. Available water capacity is very low or low. The effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Goulding soil is shallow and somewhat excessively drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, 20 percent of the surface is partially covered with gravel and with a ½-inch mat of leaves and a few twigs and grass stems. The surface layer is brown very gravelly loam about 6 inches thick. The subsoil is dark yellowish brown extremely gravelly loam about 7 inches thick. Fractured metavolcanic rock is at a depth of about 13 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Goulding soil. Available water capacity is very low. The effective

rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Hoosimbim soil is used for timber production, and the Goulding soil is used as watershed, recreational areas, or wildlife habitat.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and Pacific madrone are the main tree species on the Hoosimbim soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 102 for Douglas-fir on the Hoosimbim soil. The CACTOS 50-year site index for the Hoosimbim soil is 66.

The main concerns affecting the production and harvesting of timber on the Hoosimbim soil are the slope, the severe hazard of erosion, and the very low or low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. The limited available water capacity in the upper 24 inches of the Hoosimbim soil reduces the seedling survival rate. Trees that are suitable for planting include Douglas-fir, ponderosa pine, and sugar pine. The characteristic understory plant community on the Hoosimbim soil is mainly California hazel, poison-oak, snowberry, shrub live oak, whitethorn ceanothus, and squawcarpet. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the hazard of erosion on the Goulding soil, disturbance of the soil should be kept to a minimum. In areas where the Goulding soil supports a canopy of trees, the main species are canyon live oak, Oregon white oak, and digger pine. This soil can produce 23 cords of wood per acre from a stand of trees that average 7 inches in diameter at a height of 4.5 feet. Some areas of this soil support less than 10 percent tree canopy. In these areas the potential plant community is mainly canyon live oak, buckbrush, birchleaf mountainmahogany, greenleaf manzanita, digger pine, Lemmon needlegrass, and annual grasses. This vegetation provides food and cover for wildlife.

The land capability classification is VIIe, nonirrigated.

**160—Hotaw loam, 15 to 30 percent slopes.** This moderately deep, well drained soil is on mountains. It formed in material weathered from granitic rocks. The native vegetation is mainly mixed conifers, hardwoods, brush, and grass. Elevation is 1,900 to 2,200 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 52 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface is partially covered with a ½-inch mat of moss-covered grass stems and leaves. The surface layer is yellowish brown loam about 6 inches thick. The subsoil and the substratum are yellowish brown, light yellowish brown, very pale brown, and strong brown clay loam about 31 inches thick. Weathered granite is at a depth of about 37 inches. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Tallowbox gravelly coarse sandy loam, 30 to 50 percent slopes; Minersville sandy loam, 30 to 50 percent slopes; Haysum loam, 5 to 9 percent slopes; Haysum loam, 30 to 50 percent slopes; and areas that have slopes of less than 15 percent. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately slow in the Hotaw soil. Available water capacity is moderate. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This soil is used for timber production or homesite development.

Douglas-fir, ponderosa pine, California black oak, and Oregon white oak are the main tree species on this soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 96 for Douglas-fir. The CACTOS 50-year site index is 61.

The main concern affecting the production and harvesting of timber is the severe hazard of erosion. Minimizing the risk of erosion is essential when timber is harvested. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars and by seeding fills. Straw mulching also is effective. If the site is not adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Trees that are suitable for planting include Douglas-fir and ponderosa pine. The characteristic understory plant community is mainly iris, stipa, birchleaf mountainmahogany, deerbrush, and shrub live oak. The understory vegetation provides cover and forage for wildlife.

If this soil is used for homesite development, the main concerns are the depth to bedrock, the slope, the

hazard of erosion, and the restricted permeability. Cuts that are needed for essentially level building sites can expose weathered bedrock. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Plans for homesite development should provide for the preservation of as many trees as possible. Selection of adapted vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. The design of access roads should provide stable cut and fill slopes, and drains are needed to control surface runoff and keep soil losses to a minimum. Structures that divert runoff are needed if buildings and roads are constructed. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. The depth to bedrock severely limits the functioning of septic tank absorption fields. If the soil is used as a site for septic tank absorption fields, the restricted permeability can be overcome by increasing the size of the absorption field. The slope is also a concern on sites for septic tank absorption fields. Absorption lines should be installed on the contour. Soils disturbed by construction activities are subject to erosion during the rainy season. Temporary erosion-control measures may be necessary.

The land capability classification is VIe, nonirrigated.

**161—Hotaw loam, 30 to 50 percent slopes.** This moderately deep, well drained soil is on mountains. It formed in material weathered from granitic rocks. The native vegetation is mainly mixed conifers, hardwoods, brush, and grass. Elevation is 1,800 to 4,000 feet. The average annual precipitation is 30 to 50 inches, the average annual air temperature is 52 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface is partially covered with a ½-inch mat of moss-covered grass stems and leaves. The surface layer is yellowish brown loam about 6 inches thick. The subsoil and the substratum are yellowish brown, light yellowish brown, very pale brown, and strong brown clay loam about 31 inches thick. Weathered granite is at a depth of about 37 inches. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Tallowbox gravelly coarse sandy loam, 30 to 50 percent slopes; Minersville sandy loam, 30 to 50 percent slopes; Valcreek fine gravelly loamy coarse sand, 30 to 75 percent slopes; and areas of very cobbly clay loam that is 20 to 40 inches deep over weakly consolidated sedimentary deposits under brush, grass, and scattered oaks. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately slow in the Hotaw soil. Available water capacity is moderate. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is very severe.

This soil is used for timber production.

Douglas-fir, ponderosa pine, California black oak, and Oregon white oak are the main tree species on this soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 96 for Douglas-fir. The CACTOS 50-year site index is 61.

The main concerns affecting the production and harvesting of timber are the hazard of erosion and the slope. Minimizing the risk of erosion is essential when timber is harvested. The soil is adjacent to perennial stream channels. Disturbances in these areas can cause severe streambank erosion. Also, these areas receive surface runoff from areas upslope, and disturbances that expose bare soil can cause gullying. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars, by seeding fills, and by using filter strips. Straw mulching also is effective. The slope limits the kinds of equipment that can be used. The highlead logging method is more efficient than most other methods and is less damaging to the surface. If the site is not adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Trees that are suitable for planting include Douglas-fir and ponderosa pine. The characteristic understory plant community is mainly iris, needlegrass, birchleaf mountainmahogany, deerbrush, and shrub live oak. The understory vegetation provides cover and forage for wildlife.

The slope is a major concern if this soil is used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. The installation and functioning of septic tank absorption fields are limited by the slope and the moderate depth to bedrock.

The land capability classification is VIe, nonirrigated.

**162—Indleton-Caris-Hoosimbim complex, 50 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly conifers and hardwoods. Elevation is 3,000 to 4,750 feet. The average annual precipitation is 50 to 60 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 35 percent Indleton extremely gravelly

sandy loam, 25 percent Caris extremely gravelly sandy loam, and 20 percent Hoosimbim extremely gravelly sandy loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Marpa very gravelly sandy clay loam; Rock outcrop; Xerofluvents along drainageways under woody streamside vegetation, such as alder and willow; and Brownbear very gravelly loam. Also included are small areas of Indleton and Caris soils that have slopes of more than 75 percent and areas of Goulding very gravelly loam. Some areas of this unit are nearly barren, and some are actively eroding. These areas have been disturbed by their use as skid trails and haul roads, mostly during salvage timber harvesting following wildfires. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Indleton soil is very deep and is well drained. It formed in residuum and colluvium derived from metasedimentary rocks. Typically, 45 percent of the surface is partially covered with gravel and with a 1-inch mat of leaves, needles, twigs, and cones. The surface layer is grayish brown and pale brown extremely gravelly sandy loam about 11 inches thick. The upper 11 inches of the subsoil is pale brown extremely gravelly sandy loam. The lower part of the subsoil to a depth of 60 inches or more is pale brown extremely gravelly sandy loam and extremely gravelly sandy clay loam.

Permeability is moderate in the Indleton soil. Available water capacity is very low. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe.

The Caris soil is moderately deep and is well drained. It formed in residuum and colluvium derived from metasedimentary rocks. Typically, 60 percent of the surface is partially covered with gravel and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is light brownish gray extremely gravelly sandy loam about 3 inches thick. The subsoil and the substratum are light gray extremely gravelly loam and extremely gravelly sandy loam about 30 inches thick. Fractured metasedimentary rock is at a depth of about 33 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Caris soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Hoosimbim soil is deep and well drained. It formed in residuum and colluvium derived from mostly metavolcanic rocks and some metasedimentary rocks. Typically, 50 percent of the surface is partially covered with angular gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is yellowish brown extremely gravelly sandy loam about 4 inches thick. The upper 12 inches of the subsoil is brown and light brown very gravelly sandy clay loam. The lower 26 inches is reddish yellow extremely gravelly sandy clay loam. Fractured metavolcanic rock is at a depth of 42 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderate in the Hoosimbim soil. Available water capacity is very low or low. The effective rooting depth is 40 to 60 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used for timber production.

Douglas-fir, sugar pine, Pacific madrone, canyon live oak, and Pacific dogwood are the main tree species on the Indleton soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 127 for Douglas-fir on the Indleton soil. The CACTOS 50-year site index for the Indleton soil is 76.

Douglas-fir, ponderosa pine, sugar pine, and canyon live oak are the main tree species on the Caris soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 101 for Douglas-fir on the Caris soil. The CACTOS 50-year site index for the Caris soil is 64.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and Pacific madrone are the main tree species on the Hoosimbim soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 102 for Douglas-fir on the Hoosimbim soil. The CACTOS 50-year site index for the Hoosimbim soil is 66.

The main concerns affecting the production and harvesting of timber are the severe hazard of erosion, the slope, the very low or low available water capacity, and the gravel on the surface. Maintaining the understory vegetation helps to control erosion. Proper design of road drainage systems and care in the placement of culverts also help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Loose surface material may move down the slope and reduce the seedling survival rate. If windrowing is considered on this unit,

care should be taken to avoid removal of the surface layer. Nutrients are concentrated in the surface layer, and the Caris soil is only moderately deep over bedrock. The removal of the surface layer increases the seedling mortality rate and reduces productivity. Constructing the windrows on the contour helps to prevent erosion resulting from the concentration of surface runoff. Trees that are suitable for planting include ponderosa pine on south- and west-facing slopes and Douglas-fir and ponderosa pine on north- and east-facing slopes. The understory vegetation provides cover and forage for wildlife. The characteristic understory plant community on the Indleton and Caris soils is mainly California hazel, western brackenfern, shrub live oak, and Pacific dogwood. On the Hoosimbim soil, it is mainly deerbrush and poison-oak. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIIe, nonirrigated.

**163—Jafa loam, 0 to 5 percent slopes.** This very deep, well drained soil is on terraces and hills. It formed in alluvium from mixed rock sources. Areas are dissected by perennial streams. The native vegetation is mainly conifers, brush, hardwoods, and grass. Elevation is 2,300 to 2,800 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 5 percent of the surface is partially covered with gravel. The surface layer is brown and yellowish brown loam about 14 inches thick. The subsoil to a depth of 67 inches or more is strong brown gravelly clay loam.

Included with this soil in mapping are small areas of Jafa gravelly loam; Crefork loam, 9 to 15 percent slopes, under oaks; Xererts, 9 to 15 percent slopes, under annual forbs; Carrcreek gravelly loam on stream terraces under oaks, brush, and grass in areas that have not been cultivated; and Xerofluvents on stream terraces under woody streamside vegetation, such as willow and alder. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately slow in the Jafa soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This soil is used for homesite development, timber production, or pasture.

If this soil is used for homesite development, the main limitations are the restricted permeability and the moderate shrink-swell potential. Plans for homesite development should provide for the preservation of as many trees as possible. If the soil is used as a site for septic tank absorption fields, the restricted permeability can be overcome by increasing the size of the absorption field. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential.

Ponderosa pine and Oregon white oak are the main tree species on this soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 81 for ponderosa pine. The CACTOS 50-year site index is 52.

The main concern affecting the production and harvesting of timber is the gravelly clay loam in the subsoil. Unsurfaced roads and skid trails are soft when wet, and they may be impassable during rainy periods. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. Ponderosa pine is suitable for planting. The characteristic understory plant community is mainly fescue, greenleaf manzanita, buckbrush, and silver hairgrass. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important wildlife habitat.

Few limitations affect the use of this soil as pastureland. Under optimum management and weather conditions, areas used as irrigated pastureland can produce about 7 animal unit months per acre per year and areas used as nonirrigated pastureland can produce 2 animal unit months per acre per year.

The land capability classification is IIe-1, irrigated, and IIIe-1, nonirrigated.

**164—Jafa loam, 5 to 15 percent slopes.** This very deep, well drained soil is on terraces and hills. It formed in alluvium from mixed rock sources. Areas are dissected by perennial streams. The native vegetation is mainly conifers, brush, hardwoods, and grass. Elevation is 2,300 to 2,800 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 5 percent of the surface is partially covered with gravel. The surface layer is brown and yellowish brown loam about 14 inches thick. The subsoil is strong brown gravelly clay loam at least 61 inches thick.

Included with this soil in mapping are small areas of Jafa gravelly loam; Crefork loam, 9 to 15 percent slopes, under oaks; Xererts, 9 to 15 percent slopes, under annual forbs; Carrcreek gravelly loam on stream terraces under oaks, brush, and grass in areas that have not been cultivated; and Xerofluvents on stream terraces under woody streamside vegetation, such as willow and alder. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately slow in the Jafa soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate.

This soil is used for homesite development, timber production, or pasture.

If this soil is used for homesite development, the main limitations are the slope, the restricted permeability, and the moderate shrink-swell potential. Plans for homesite development should provide for the preservation of as many trees as possible. The plant cover can be established and maintained by properly applying fertilizer, seeding, mulching, and land shaping. If the soil is used as a site for septic tank absorption fields, the restricted permeability can be overcome by increasing the size of the absorption field. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential.

Ponderosa pine and Oregon white oak are the main tree species on this soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 81 for ponderosa pine. The CACTOS 50-year site index is 52.

The main concern affecting the production and harvesting of timber is the gravelly clay loam in the subsoil. Unsurfaced roads and skid trails are soft when wet, and they may be impassable during rainy periods. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. Ponderosa pine is suitable for planting. The characteristic understory plant community is mainly fescue, greenleaf manzanita, buckbrush, and silver hairgrass. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important wildlife habitat.

If this soil is used as pastureland, the main concern is the hazard of erosion. Grazing when the soil is too moist results in compaction of the surface layer and poor tilth and increases the hazard of erosion. Under optimum management and weather conditions, areas used as irrigated pastureland can produce about 7 animal unit months per acre per year and areas used as nonirrigated pastureland can produce 2 animal unit months per acre per year.

The land capability classification is IIIe-1, irrigated and nonirrigated.

**165—Jafa gravelly loam, 0 to 2 percent slopes.** This very deep, well drained soil is on terraces. It formed in alluvium from mixed rock sources. The native vegetation is mainly conifers, oaks, and brush. Elevation is 2,200 to 3,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface layer is brown gravelly loam about 18 inches thick. The subsoil to a depth of 74 inches or more is light brown gravelly clay loam and strong brown gravelly sandy clay loam.

Included with this soil in mapping are small areas of Jafa soils that have slopes of more than 2 percent; Jafa loam; Crefork loam, 2 to 9 percent slopes, on hills under grasses and oaks; and Carrcreek gravelly loam under oaks and grasses on stream terraces and alluvial fans. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately slow in the Jafa soil. Available water capacity is moderate. The effective rooting depth is more than 60 inches. Runoff is slow, and the hazard of water erosion is slight.

This soil is used for timber production or homesite development.

Ponderosa pine, Oregon white oak, and Douglas-fir are the main tree species on this soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 96 for ponderosa pine. The CACTOS 50-year site index is 75.

The main concern affecting the production and harvesting of timber is plant competition. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. Ponderosa pine is suitable for planting. The characteristic understory plant community is mainly greenleaf manzanita, whiteleaf manzanita, deerbrush, buckbrush, and grasses. Understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

If this unit is used for homesite development, the main limitation is the restricted permeability. Plans for homesite development should provide for the preservation of as many trees as possible. If the soil is used as a site for septic tank absorption fields, the restricted permeability can be overcome by increasing the size of the absorption field.

The land capability classification is IIIs-I, nonirrigated.

**166—Jafa gravelly loam, 2 to 9 percent slopes.** This very deep, well drained soil is on terraces. It formed in alluvium from mixed rock sources. The native vegetation is mainly conifers, oaks, and brush. Elevation is 1,700 to 3,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface layer is brown gravelly loam about 18 inches thick. The subsoil to a depth of 60 inches or more is light brown gravelly clay loam and

strong brown gravelly sandy clay loam.

Included with this soil in mapping are small areas of Jafa soils that have slopes of more than 9 percent; Jafa loam; Crefork loam on hills under grass and oaks; and Carrcreek gravelly loam, 2 to 5 percent slopes, under oaks and grasses on stream terraces and alluvial fans. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately slow in the Jafa soil. Available water capacity is moderate. The effective rooting depth is more than 60 inches. Runoff is medium, and the hazard of water erosion is slight.

This soil is used for timber production or homesite development.

Ponderosa pine, Oregon white oak, and Douglas-fir are the main tree species on this soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 96 for ponderosa pine. The CACTOS 50-year site index is 75.

The main concern affecting the production and harvesting of timber is plant competition. Management measures that improve or maintain the plant cover and promote the accumulation of litter on the surface reduce the hazard of erosion and increase the rate of water infiltration. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. Ponderosa pine is suitable for planting. The characteristic understory plant community is mainly greenleaf manzanita, whiteleaf manzanita, deerbrush, buckbrush, and grasses. Understory vegetation provides cover and forage for wildlife.

If this soil is used for homesite development, the main limitation is the restricted permeability. Plans for homesite development should provide for the preservation of as many trees as possible. Preserving the existing plant cover during construction helps to control erosion. If the soil is used as a site for septic tank absorption fields, the restricted permeability can be overcome by increasing the size of the absorption field. The shrink-swell potential is moderate. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential.

The land capability classification is IIIe-l, nonirrigated.

**167—Jafa gravelly loam, clayey substratum, 15 to 30 percent slopes.** This very deep, well drained soil is on terraces and hills. It formed in alluvium from mixed rock sources. The native vegetation is mainly mixed conifers, hardwoods, and brush. Elevation is 2,500 to 3,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface is partially covered with a 1-inch mat of needles, leaves, and twigs. The surface layer is yellowish brown gravelly loam about 10 inches thick. The upper 11 inches of the subsoil is strong brown gravelly clay loam. The next layer also is strong brown gravelly clay loam. It is about 23 inches thick. The lower part of the subsoil to a depth of 60 inches or more is yellowish brown clay.

Included with this soil in mapping are small areas of Jafa soils that have slopes of 30 to 50 percent; Crefork clay loam, 15 to 30 percent slopes, under hardwoods and grasses; Jafa gravelly loam, 2 to 9 percent slopes; Jafa loam, 5 to 15 percent slopes; and areas that have slopes of less than 15 percent. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is very slow in the Jafa soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is moderate.

This soil is used for timber production or homesite development.

Ponderosa pine, Oregon white oak, and Douglas-fir are the main tree species on this soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 104 for Douglas-fir. The CACTOS 50-year site index is 89.

The main concern affecting the production and harvesting of timber is a moderate hazard of surface compaction. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and can damage the roots of trees. If the site is not adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Trees that are suitable for planting include ponderosa pine and Douglas-fir. The characteristic understory plant community is mainly buckbrush, greenleaf manzanita, and whiteleaf manzanita. The understory vegetation provides cover and forage for wildlife.

If this soil is used for homesite development, the main limitations are the slope, a high shrink-swell potential below a depth of 40 inches, and the very slow permeability. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. The hazard of erosion is increased if the soil is left exposed during site development. Topsoil can be stockpiled and used to reclaim areas that have been disturbed during construction. Structures that divert runoff are needed if buildings and roads are constructed. The design of access roads should provide stable cut and fill slopes, and drains are needed to

control surface runoff and keep soil losses to a minimum. Plans for homesite development should provide for the preservation of as many trees as possible. If this soil is used as a site for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the very slow permeability. During the rainy season, however, septic tank absorption fields may still fail to function properly. The slope is a management concern when septic tank absorption fields are installed. Absorption lines should be installed on the contour. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential.

The land capability classification is IVe-3, nonirrigated.

**170—Marpa-Hoosimbim complex, 30 to 50 percent slopes.** This map unit is on mountains. The native vegetation is mainly mixed conifers, hardwoods, and brush. Elevation is 3,000 to 3,750 feet. The average annual precipitation is 50 to 60 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Marpa very gravelly sandy clay loam and 35 percent Hoosimbim extremely gravelly sandy loam. It consists of areas that have been highly disturbed by mining activities. The Marpa and Hoosimbim soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Brownbear very gravelly loam, areas of Bamtush extremely gravelly loam, and areas that have slopes of more than 50 percent. Some areas are barren and actively eroding. Other areas show evidence of past erosion. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Marpa soil is moderately deep and is well drained. It formed in material weathered from sedimentary rocks. Typically, 60 percent of the surface is partially covered with gravel and with scattered leaves and twigs. The surface layer is brown very gravelly sandy clay loam about 3 inches thick. The subsoil is brown and strong brown very gravelly clay loam and extremely gravelly clay loam about 28 inches thick. Fractured sedimentary rock is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Marpa soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Hoosimbim soil is deep and well drained. It formed in material weathered from metasedimentary rocks. Typically, 50 percent of the surface is partially covered with angular gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is yellowish brown extremely gravelly sandy loam about 4 inches thick. The upper 12 inches of the subsoil is brown and light brown very gravelly sandy clay loam. The lower 26 inches is reddish yellow extremely gravelly sandy clay loam. Fractured metasedimentary rock is at a depth of about 42 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderate in the Hoosimbim soil. Available water capacity is very low or low. The effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used for timber production.

Ponderosa pine, Douglas-fir, sugar pine, canyon live oak, and California black oak are the main tree species on the Marpa soil. On the basis of a 100-year site curve (Meyer, 1938; McArdle and Meyer, 1961), the mean site index is 63 for ponderosa pine and 78 for Douglas-fir. The CACTOS 50-year site index is 47.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and Pacific madrone are the main tree species on the Hoosimbim soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 102 for Douglas-fir. Because of the low basal area and extent of the main commercial species, yields commonly are only 80 percent of those of normal stands. The CACTOS 50-year site index for the Hoosimbim soil is 66.

The main concerns affecting the production and harvesting of timber are the moderate hazard of erosion, the slope, the very low or low available water capacity, and the gravel on the surface. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope limits the kinds of equipment that can be used. Careful management of reforestation is needed to reduce competition from undesirable understory plants. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Trees that are suitable for planting include ponderosa pine on the Marpa soil and on the south slopes of the Hoosimbim soil. Douglas-fir and ponderosa pine are suitable for planting on the north slopes of the Hoosimbim soil. The characteristic understory plant community is mainly shrub live oak and greenleaf manzanita on the Marpa soil. It is mainly deerbrush and poison-oak on the

Hoosimbim soil. The understory vegetation provides cover and forage for wildlife.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. The installation and functioning of septic tank absorption fields are severely limited by the slope and the moderate depth to bedrock in areas of the Marpa soil.

The land capability classification is VIe, nonirrigated.

**171—Marpa-Hoosimbim-Bamtush complex, 50 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly conifers, hardwoods, and brush. Elevation is 2,500 to 4,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 45 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 35 percent Marpa very gravelly sandy clay loam, 25 percent Hoosimbim extremely gravelly sandy loam, and 20 percent Bamtush extremely gravelly loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Caris extremely gravelly sandy loam, Indleton extremely gravelly sandy loam, and Dubakella cobbly clay loam, 30 to 50 percent slopes, under sparse conifers and brush. Also included are small areas of Hoosimbim, Bamtush, and Marpa soils that have slopes of less than 50 percent and areas of Xerofluvents along drainageways under woody streamside vegetation, such as alder and willow. On the Lewiston map sheet, areas of Marpa Variant gravelly clay loam, 15 to 30 percent slopes, are included. If they are used for homesite development, these areas are limited by depth to bedrock and slow permeability. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Marpa soil is moderately deep and is well drained. It formed in residuum and colluvium derived from metavolcanic and metasedimentary rocks. Typically, 60 percent of the surface is partially covered with gravel and with scattered leaves and twigs. The surface layer is brown very gravelly sandy clay loam about 3 inches thick. The subsoil is brown and strong brown very gravelly clay loam and extremely gravelly clay loam about 28 inches thick. Fractured metamorphic bedrock is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Marpa soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Hoosimbim soil is deep and well drained. It formed in residuum and colluvium derived from mostly metavolcanic rocks and some metasedimentary rocks. Typically, 50 percent of the surface is partially covered with gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is yellowish brown extremely gravelly sandy loam about 4 inches thick. The upper 12 inches of the subsoil is brown and light brown very gravelly sandy clay loam. The lower 26 inches is reddish yellow extremely gravelly sandy clay loam. Fractured metavolcanic rock is at a depth of about 42 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderate in the Hoosimbim soil. Available water capacity is very low or low. The effective rooting depth is 40 to 60 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Bamtush soil is very deep and is well drained. It formed in residuum and colluvium derived from metavolcanic and some metasedimentary rocks. Typically, 30 percent of the surface is partially covered with gravel and cobbles and with a 2-inch mat of needles, leaves, twigs, and cones. The surface layer is dark grayish brown and brown extremely gravelly loam about 6 inches thick. The upper 8 inches of the subsoil is yellowish brown very gravelly loam. The lower 53 inches is brown and reddish yellow very gravelly sandy clay loam.

Permeability is moderate in the Bamtush soil. Available water capacity is low. The effective rooting depth is more than 60 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used for timber production.

Ponderosa pine, Douglas-fir, sugar pine, canyon live oak, and California black oak are the main tree species on the Marpa soil. On the basis of a 100-year site curve (Meyer, 1938; McArdle and Meyer, 1961), the mean site index is 63 for ponderosa pine and 78 for Douglas-fir. The CACTOS 50-year site index is 47.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and Pacific madrone are the main tree species on the Hoosimbim soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 102 for Douglas-fir. The CACTOS 50-year site index is 66.

Douglas-fir, ponderosa pine, California black oak, sugar pine, Pacific madrone, and canyon live oak are the main tree species on the Bamtush soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 123 for Douglas-fir. The CACTOS 50-year site index is 73.

The main concerns affecting the production and

harvesting of timber are the severe hazard of erosion, the slope, the very low or low available water capacity, and the gravel on the surface. Maintaining the understory vegetation helps to control erosion. Proper design of road drainage systems and care in the placement of culverts also help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Loose surface material may move down the slope and reduce seedling survival on the soils in this unit. If windrowing is considered on the Marpa soil, care should be taken to avoid removal of the upper part of the surface layer because the soil is moderately deep over bedrock and has nutrients concentrated in a thin surface layer. The removal of the surface layer increases the seedling mortality rate and reduces productivity. Constructing windrows on the contour helps to prevent the erosion resulting from the concentration of surface runoff. Extending the windrow piles entirely across the cleared slope helps to catch the surface runoff. Erosion can be minimized by reducing the downslope distance between windrow piles. Trees that are suitable for planting include ponderosa pine on the Marpa soil and on the south slopes of the Bamtush and Hoosimbim soils. Douglas-fir and ponderosa pine are suitable for planting on the north slopes of the Bamtush and Hoosimbim soils. The characteristic understory plant community is mainly canyon live oak and California hazel on the Bamtush and Marpa soils. It is mainly deerbrush and poison-oak on the Hoosimbim soil. The understory vegetation provides cover and forage for wildlife.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. Septic tank absorption fields do not function properly because of the slope.

The land capability classification is VIIe, nonirrigated.

**172—Marpa-Vitzthum complex, 50 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly mixed conifers on the Marpa soil and brush, hardwoods, conifers, and grass on the Vitzthum soil. Elevation is 2,500 to 4,200 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Marpa very gravelly sandy clay loam and 35 percent Vitzthum extremely gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Hoosimbim extremely gravelly sandy loam, Brownscreek gravelly loam, Caris extremely gravelly sandy loam, and Dougcity gravelly loam. Also included are small areas used as paved roadway on cuts and fills. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Marpa soil is moderately deep and is well drained. It formed in residuum and colluvium derived from metavolcanic and metasedimentary rocks. Typically, 60 percent of the surface is partially covered with gravel and with scattered leaves and twigs. The surface layer is brown very gravelly sandy clay loam about 3 inches thick. The subsoil is brown and strong brown very gravelly clay loam and extremely gravelly clay loam about 28 inches thick. Fractured metamorphic rock is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Marpa soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Vitzthum soil is shallow and somewhat excessively drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, 75 percent of the surface is partially covered with gravel and with a 1-inch mat of leaves and twigs. The surface layer is dark yellowish brown extremely gravelly loam about 3 inches thick. The subsoil is brown or strong brown extremely gravelly sandy clay loam about 14 inches thick. Fractured hard metavolcanic rock is at a depth of about 17 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Vitzthum soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Marpa soil is used for timber production. The Vitzthum soil is used as watershed, recreational areas, or wildlife habitat.

Ponderosa pine, Douglas-fir, sugar pine, and canyon live oak are the main tree species on the Marpa soil. On the basis of a 100-year site curve (Meyer, 1938; McArdle and Meyer, 1961), the mean site index is 63

for ponderosa pine and 78 for Douglas-fir. The CACTOS 50-year site index is 47.

The main concerns affecting the production and harvesting of timber on the Marpa soil are the slope, the severe hazard of erosion, and the very low or low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Trees that are suitable for planting include ponderosa pine, Douglas-fir, and sugar pine. The characteristic understory plant community on the Marpa soil is mainly greenleaf manzanita, shrub live oak, and poison-oak. Understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the severe hazard of erosion in areas of the Vitzthum soil, disturbance of the soil should be kept to a minimum. The Vitzthum soil produces vegetation that provides food and cover for wildlife. The potential plant community is mainly greenleaf manzanita, canyon live oak, birchleaf mountainmahogany, and grasses.

The land capability classification is VIIe, nonirrigated.

**173—Marpa Variant-Goulding-Holkat Variant complex, 30 to 50 percent slopes.** This map unit is on mountains. The native vegetation is mainly hardwoods, grass, brush, and scattered conifers. Elevation is 1,900 to 2,800 feet. The average annual precipitation is 40 to 50 inches, the average annual temperature is 50 to 57 degrees F, and the average frost-free season is 90 to 130 days.

This unit is 30 percent Marpa Variant gravelly clay loam, 25 percent Goulding very gravelly loam, and 25 percent Holkat Variant clay loam. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Haysum gravelly loam, 5 to 9 percent slopes; areas of a dense, clayey soil that is 20 to 40 inches deep over fractured bedrock; areas of a very gravelly clay loam that is 40 to 60 inches deep over bedrock; and areas that have slopes of less than 30 percent. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Marpa Variant soil is moderately deep and is well drained. It formed in material weathered from metasedimentary rocks. Typically, the surface is partially covered with a ½-inch mat of needles, leaves, twigs, and limbs. The surface layer is light brownish gray gravelly clay loam about 10 inches thick. The upper 9 inches of the subsoil is brown very cobbly clay loam. The lower 17 inches is light reddish brown very cobbly clay. Fractured metamorphosed shale rock is at a depth of about 36 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is slow in the Marpa Variant soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Goulding soil is shallow and somewhat excessively drained. It formed in material weathered from metasedimentary rocks. Typically, 20 percent of the surface is partially covered with gravel and with a ½-inch mat of leaves, twigs, and grass stems. The surface layer is brown very gravelly loam about 6 inches thick. The subsoil is dark yellowish brown extremely gravelly loam about 7 inches thick. Fractured bedrock is at a depth of about 13 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Goulding soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Holkat Variant soil is moderately deep and is well drained. It formed in material weathered from metasedimentary rocks. Typically, the surface layer is light brownish gray clay loam about 11 inches thick. The subsoil is pale brown gravelly clay loam about 12 inches thick. Metasedimentary rock is at a depth of about 23 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Holkat Variant soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Marpa Variant soil is used for timber production. The Goulding and Holkat Variant soils are used as watershed areas, recreational areas, or wildlife habitat. Wood products, such as firewood, are harvested in some areas.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. Septic tank absorption fields do not function properly because of the slope and the shallow depth of the Goulding soil.

Ponderosa pine, Oregon white oak, California black oak, Douglas-fir, and canyon live oak are the main tree species on the Marpa Variant soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 83 for ponderosa pine. The CACTOS 50-year site index is 54.

The main concerns affecting the production and harvesting of timber on the Marpa Variant soil are the severe hazard of erosion, the slope, and the low available water capacity in the surface layer. Roads and landings can be protected against erosion by constructing water bars. The use of conventional harvesting methods is restricted by the slope. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Ponderosa pine is suitable for planting on the Marpa Variant soil. The characteristic understory plant community on this soil is mainly buckbrush, needlegrass, native rose, shrub live oak, and silver hairgrass. The understory vegetation provides cover and forage for wildlife.

Careful management of watershed areas, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the moderate or severe hazard of erosion, disturbance of these soils should be kept to a minimum.

In areas where the Goulding soil supports a canopy of trees, canyon live oak, Oregon white oak, and digger pine are the main species. This soil can produce 23 cords of wood per acre from a stand of trees that average 7 inches in diameter at a height of 4.5 feet. Some areas of this soil support less than 10 percent tree canopy. Vegetation consists of canyon live oak, buckbrush, birchleaf mountainmahogany, greenleaf manzanita, digger pine, Lemmon needlegrass, and annual grasses. This vegetation provides food and cover for wildlife.

Oregon white oak, California black oak, digger pine, and ponderosa pine are the main tree species on the Holkat Variant soil. This soil can produce 33 cords of wood per acre from a stand of trees that average 11 inches in diameter at a height of 4.5 feet. The characteristic understory plant community is mainly buckbrush, birchleaf mountainmahogany, California fescue, and silver hairgrass.

The land capability classification is VIe, nonirrigated.

**175—Millsholm loam, 5 to 9 percent slopes.** This shallow, well drained soil is on hills. It formed in material weathered from mudstone. The native vegetation is mainly grasses and hardwoods. Elevation is 1,900 to 2,100 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 57 to 62 degrees F, and the average frost-free period is 130 to 180 days.

Typically, 10 percent of the surface is partially covered with gravel mixed with leaves and twigs. The surface layer and subsurface layer are light yellowish brown loam about 11 inches thick. Fractured mudstone is at a depth of about 11 inches. The depth to bedrock ranges from 10 to 20 inches.

Included with this soil in mapping are small areas of a very gravelly clay loam that is 10 to 20 inches deep, areas of a clay soil that is 10 to 20 inches deep near Reading Creek under pasture vegetation, areas of Azule silty clay loam, 15 to 30 percent slopes, and areas of Musserhill Variant that have slopes of 5 to 9 percent. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Millsholm soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is slight.

This soil is used as pasture or for homesite development.

If this soil is used as pasture, the main limitations are the depth to bedrock and the very low available water capacity. Vegetation that is suitable for grazing by livestock is sparse. The herbaceous plant cover readily deteriorates if it is overgrazed. Under optimum management and weather conditions, areas used as nonirrigated pasture can produce only about 0.5 animal unit month per acre per year.

If this soil is used for homesite development, the main limitation is the depth to bedrock. The cuts that are needed to provide essentially level building sites can expose the bedrock. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Plans for homesite development should provide for the preservation of as many trees as possible. The installation and functioning of septic tank absorption fields are severely limited by the shallowness to bedrock.

In areas where this soil supports a canopy of trees, blue oak and digger pine are the main species. The soil can produce 8 cords of wood per acre from a stand of trees that average 10 inches in diameter at a height of 4.5 feet. Some areas support less than 10 percent tree canopy. The characteristic understory plant community is mainly greenleaf manzanita, deerbrush, and grass. The understory vegetation provides cover and forage for wildlife.

The land capability classification is VIe, nonirrigated.

**176—Millsholm-Azule complex, 15 to 30 percent slopes.** This map unit is on hills. Areas are dissected by perennial streams. The native vegetation is mainly hardwoods and grasses and some brush. Elevation is 1,900 to 2,500 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 57 to 60 degrees F, and the average frost-free period is 130 to 180 days.

This unit is 50 percent Millsholm loam and 30 percent Azule silty clay loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Musserhill Variant loam, Springgulch gravelly clay loam, Brockgulch Variant soils that have a surface layer of gravelly clay loam, areas that have stones on the surface and that support digger pine, and Xerofluvents along stream channels under woody streamside vegetation, such as willow and alder. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Millsholm soil is shallow and well drained. It formed in material weathered from mudstone. Typically, 10 percent of the surface is partially covered with gravel mixed with leaves and twigs. The surface layer and subsurface layer are light yellowish brown loam about 11 inches thick. Fractured mudstone is at a depth of about 11 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Millsholm soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Azule soil is moderately deep and is well drained. It formed in material weathered from mudstone. Typically, the surface is partially covered with a ½-inch mat of leaves, grass stems, and twigs. The surface layer is light gray silty clay loam about 4 inches thick. The subsoil is very pale brown and light yellowish brown clay about 32 inches thick. Weakly consolidated mudstone is at a depth of about 36 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is slow in the Azule soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used for wood products or as pasture.

Blue oak and digger pine are the main tree species on these soils. The Millsholm soil can produce 8 cords of wood per acre from a stand of trees that average 9 inches in diameter at a height of 4.5 feet. The Azule soil can produce 53 cords of wood per acre from a stand of trees that average 9 inches in diameter at a height of 4.5 feet. Some areas of the Millsholm soil support less than 10 percent tree canopy.

If this unit is used for harvesting wood products, the main concern is the moderate hazard of erosion. The design of access roads should provide stable cut and fill slopes, and drains are needed to control surface runoff and keep soil losses to a minimum. Using wheeled and tracked equipment when the Azule soil is moist produces ruts, compacts the soil, and can damage the roots of trees. The characteristic understory plant community on these soils is mainly grasses, greenleaf manzanita, deerbrush, and poison-oak. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

If these soils are used as pasture, the main concern is the moderate hazard of erosion. Grazing when the soils are wet results in compaction of the surface layer and poor tilth and increases the hazard of erosion. The herbaceous plant cover readily deteriorates if it is overgrazed. Under optimum management and weather conditions, areas used as nonirrigated pastureland can produce only about 0.5 animal unit month per acre per year.

The land capability classification is VIe, nonirrigated.

**177—Minersville sandy loam, 50 to 75 percent slopes.** This deep, well drained soil is on mountains. It formed in residuum and colluvium derived from granitic rock. Areas are dissected by perennial streams. The native vegetation is mainly conifers and some hardwoods and brush. Elevation is 2,500 to 4,500 feet. The average annual precipitation is 55 to 65 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface is partially covered with a 2-inch mat of needles, twigs, cones, and branches. The surface layer is pale brown sandy loam about 5 inches thick. The subsoil is very pale brown sandy loam and fine gravelly coarse sandy loam about 25 inches thick. The substratum is light gray and very pale brown very gravelly coarse sandy loam about 13 inches thick. Weathered granitic rock is at a depth of about 43 inches. The depth to bedrock ranges from 40 to more than 60 inches.

Included with this soil in mapping are small areas of Tallowbox gravelly coarse sandy loam on exposed slopes dominated by ponderosa pine. Also included are small areas of Haploxerolls, 2 to 9 percent slopes, on small alluvial fans along drainageways; Xerofluvents along drainageways under woody streamside vegetation, such as alder and willow; and Minersville soils that have slopes of less than 50 percent. Included areas make up about 20 percent of the total acreage.

The percentage varies from one area to another.

Permeability is moderately rapid in the Minersville soil. Available water capacity is low or moderate. The effective rooting depth is 40 to more than 60 inches. Runoff is very rapid, and the hazard of water erosion is very severe.

This unit is used for timber production.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and white fir are the main tree species on this soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 101 for Douglas-fir. The CACTOS 50-year site index is 69.

The main concerns affecting the production and harvesting of timber are the slope, the hazard of erosion, and the low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. The highlead logging method is more efficient than most other methods and causes less damage to the surface. Minimizing the risk of erosion is essential when timber is harvested. Areas of this soil occur adjacent to stream channels. Disturbances in these areas can cause severe streambank erosion. Also, these areas are highly susceptible to surface runoff from areas upslope, and disturbances that expose bare soil can cause gullying. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars and by seeding fills. Straw mulching also is effective. Maintaining the understory vegetation is essential for the control of erosion. The low available water capacity reduces the seedling survival rate. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Trees that are suitable for planting include Douglas-fir and ponderosa pine. The characteristic understory plant community is mainly California fescue, blue wildrye, brackenfern, and manzanita. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The slope is a major concern if this soil is used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. The installation and functioning of septic tank absorption fields are severely limited by the slope.

The land capability classification is VIIe, nonirrigated.

**178—Minersville Variant-Choop complex, 50 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly conifers and brush on the Minersville Variant soil and is mainly brush on the Choop soil. Elevation is 4,500 to 6,000 feet. The average annual precipitation is 65 to 70 inches, the average annual air temperature is 43 to 45 degrees F, and the average frost-free period is 70 to 90 days.

This unit is 60 percent Minersville Variant fine gravelly loamy coarse sand and 20 percent Choop fine gravelly loamy coarse sand. The Minersville Variant soil is mostly on north-facing, concave slopes, and the Choop soil is mostly on exposed convex spur ridges. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Valcreek very gravelly loamy coarse sand on the lower slopes. Also included are small areas of Minersville sandy loam on the lower slopes, Rock outcrop on ridgetops, and Haploxerolls, 2 to 9 percent slopes, along drainageways. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Minersville Variant soil is moderately deep and is well drained. It formed in material weathered from granitic rocks. Typically, the surface is partially covered with a 3-inch mat of fir needles, twigs, and limbs. The upper 9 inches of the surface layer is dark grayish brown fine gravelly loamy coarse sand. The lower part of the surface layer and the underlying material, to a depth of about 34 inches, are brown and light brownish gray very gravelly loamy coarse sand. Weathered granitic rock is at a depth of about 34 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is rapid in the Minersville Variant soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is very severe.

The Choop soil is shallow and excessively drained. It formed in material weathered from granitic rock. Typically, 40 percent of the surface is partially covered with fine gravel. The surface layer is very dark grayish brown or dark brown fine gravelly loamy coarse sand about 12 inches thick. Weathered granitic rock is at a depth of about 12 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is rapid in the Choop soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is very severe.

The Minersville Variant soil is used for timber production. The Choop soil is used as watershed areas, recreational areas, or wildlife habitat.

White fir and California red fir are the main tree species on the Minersville Variant soil. On the basis of a 50-year site curve (Schumacher, 1926), the mean site

index is 52 for white fir. The CACTOS 50-year site index is 50.

The main concerns affecting the production and harvesting of timber on the Minersville Variant soil are the slope, the hazard of erosion, and the very low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. The highlead method of logging is more efficient than most other methods and causes less damage to the surface. Minimizing the risk of erosion is essential when timber is harvested. Areas of this soil occur adjacent to stream channels. Disturbances in these areas can cause severe streambank erosion. Also, these areas are highly susceptible to surface runoff from areas upslope, and disturbances that expose bare soil can cause gullying. Maintaining the understory vegetation is essential for the control of erosion. The low available water capacity reduces the seedling survival rate. Trees that are suitable for planting include red fir and white fir. The characteristic understory plant community on the Minersville Variant soil is mainly shrub tanoak, sierra chinkapin, and pinemat manzanita. The understory vegetation provides cover and forage for wildlife.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the very severe hazard of erosion, disturbance of the soils should be kept to a minimum. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars and by seeding fills. Straw mulching also is effective. The Choop soil produces vegetation that provides cover and forage for wildlife. The potential plant community on the Choop soil is mainly greenleaf manzanita, shrub tanoak, sierra chinkapin, and squawcarpet. The native vegetation is mainly brush because of the very low available water capacity and the shallow depth to bedrock.

The land capability classification is VIIs, nonirrigated.

**179—Musserhill gravelly loam, 15 to 30 percent slopes.** This moderately deep, well drained soil is on hills. It formed in material weathered from weakly consolidated conglomerate. Areas are dissected by perennial streams. The native vegetation is mainly hardwoods, brush, conifers, and grass. Elevation is 2,000 to 3,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface is partially covered with a ½-inch mat of leaves, twigs, and grass stems. The surface layer is brown gravelly loam about 5 inches thick. The upper 6 inches of the subsoil is reddish brown very gravelly clay loam. The lower 21 inches is reddish brown extremely cobbly clay loam. Weakly consolidated conglomerate is at a depth of about 32 inches. The depth to weakly consolidated conglomerate ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Crefork clay loam, 15 to 30 percent slopes; Weaverville clay loam, 15 to 30 percent slopes, under conifers; areas of very deep very gravelly clay loam; and areas of Xerofluvents along stream channels under woody streamside vegetation, such as willow and alder. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately slow in the Musserhill soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used for homesite development or wood products.

If this soil is used for homesite development, the main limitations are the depth to weakly consolidated conglomerate, a moderate shrink-swell potential, the slope, and the moderately slow permeability. The cuts that are needed to provide essentially level building sites can expose the weakly consolidated conglomerate. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Plans for homesite development should provide for the preservation of as many trees as possible. The design of buildings and roads should offset the effects of shrinking and swelling. The depth to bedrock severely limits the functioning of septic tank absorption fields. If this soil is used as a site for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the restricted permeability. During the rainy season, however, septic tank absorption fields can still fail to function properly. The slope is a management concern affecting the installation of septic tank absorption fields. Absorption lines should be installed on the contour. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Areas disturbed by construction are subject to erosion during the rainy season. Temporary erosion-control measures may be necessary.

Oregon white oak and digger pine are the main tree species on this soil. The soil can produce 18 cords of wood per acre from a stand of trees that average 8 inches in diameter at a height of 4.5 feet. The characteristic understory plant community is buckbrush, greenleaf manzanita, brome, and bluegrass. The

understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The slope and the texture of the subsoil limit accessibility for cutting wood and for other activities involving the use of equipment. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the surface, and can damage the roots of trees.

The land capability classification is IVe-1, nonirrigated.

**180—Musserhill gravelly loam, 30 to 50 percent slopes.** This moderately deep, well drained soil is on hills. It formed in material weathered from weakly consolidated conglomerate. The native vegetation is mainly hardwoods, brush, grass, and conifers. Elevation is 2,000 to 3,300 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface is partially covered with a ½-inch mat of leaves, twigs, and grass stems. The surface layer is brown gravelly loam about 5 inches thick. The upper 6 inches of the subsoil is reddish brown very gravelly clay loam. The lower 21 inches is reddish brown extremely cobbly clay loam. Weakly consolidated conglomerate is at a depth of about 32 inches. The depth to weakly consolidated conglomerate ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Weaverville clay loam under conifers; Xeralfs that are severely eroded and steep scarps as much as 75 feet tall resulting from hydraulic mining; Musserhill soils that have slopes of less than 30 percent; and areas of a gravelly clay that is 20 to 40 inches deep over weathered mudstone and that supports oaks. Also included are small areas of Rubble land and deposits of cobbles and gravel in piles from hydraulic mining. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately slow in the Musserhill soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for wood products or homesite development.

Oregon white oak and digger pine are the main tree species on this soil. The soil can produce 18 cords of wood per acre from a stand of trees that average 8 inches in diameter at a height of 4.5 feet. The characteristic understory plant community is buckbrush, greenleaf manzanita, brome, and bluegrass. Understory vegetation provides cover and forage for wildlife.

The main limitations that affect the harvesting of trees are the severe hazard of erosion and the texture of the subsoil. Unsurfaced roads are slippery and can easily become rutted when wet, and they may be impassable during rainy periods. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Management measures that improve or maintain the plant cover and promote the accumulation of litter on the surface reduce the hazard of erosion and increase the rate of water infiltration.

If this unit is used for homesite development, the main limitations are the depth to weakly consolidated conglomerate, a moderate shrink-swell potential, the slope, the severe hazard of erosion, and the moderately slow permeability. The cuts that are needed to provide essentially level building sites can expose the weakly consolidated conglomerate. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Areas disturbed during construction are subject to erosion during the rainy season. Temporary erosion-control measures may be necessary. Plans for homesite development should provide for the preservation of as many trees as possible. The design of buildings and roads should offset the effects of shrinking and swelling. If this soil is used as a site for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the restricted permeability. During the rainy season, however, the septic tank absorption fields may still fail to function properly. The slope is a management concern affecting the installation of septic tank absorption fields. Absorption lines should be installed on the contour. The depth to conglomerate also severely limits the functioning of septic tank absorption fields.

The land capability classification is VIe, nonirrigated.

In an area north of Weaverville, this unit is mapped adjacent to the soil survey of the Shasta-Trinity National Forest Area. The delineations of this soil do not match those on the maps of the adjacent soil survey.

**181—Musserhill-Weaverville complex, 15 to 30 percent slopes.** This map unit is on hills. Areas are dissected by perennial streams. The native vegetation is mainly hardwoods, brush, conifers, and grass. Elevation is 2,000 to 2,900 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 52 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Musserhill gravelly loam and 35 percent Weaverville clay loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Crefork clay loam, areas that have slopes of less than 15 percent, areas of clay soils that are 20 to 40 inches deep over weakly consolidated mudstone, and areas of a very gravelly clay loam that is more than 40 inches deep. Also included are small areas of Xerofluvents along stream channels under woody streamside vegetation, such as willow and alder, and areas that have been used as paved or dirt roads. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Musserhill soil is moderately deep and is well drained. It formed in material weathered from weakly consolidated conglomerate. Typically, the surface is partially covered with a ½-inch mat of leaves, twigs, and grass stems. The surface layer is brown gravelly loam about 5 inches thick. The upper 6 inches of the subsoil is reddish brown very gravelly clay loam. The lower 21 inches is reddish brown extremely cobbly clay loam. Weakly consolidated conglomerate is at a depth of about 32 inches. The depth to weakly consolidated conglomerate ranges from 20 to 40 inches.

Permeability is moderately slow in the Musserhill soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Weaverville soil is very deep and is well drained. It formed in material weathered from weakly consolidated, moderately fine grained sediments. Typically, 15 percent of the surface is partially covered with gravel and cobbles and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is reddish brown clay loam about 4 inches thick. The upper 52 inches of the subsoil is yellowish red gravelly loam over yellowish red and red gravelly clay loam. The lower part of the subsoil to a depth of 81 inches or more is red very gravelly clay loam.

Permeability is moderately slow in the Weaverville soil. Available water capacity is high or very high. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used for homesite development, wood products, or timber production.

If these soils are used for homesite development, the main concerns are the moderate hazard of erosion, the slope, a moderate shrink-swell potential, and the moderately slow permeability. The Musserhill soil also is limited by the depth to weakly consolidated conglomerate, and the Weaverville soil is limited by mass movement potential. The cuts that are needed to provide essentially level building sites can expose the weakly consolidated conglomerate in the Musserhill soil. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Plans for homesite development should provide for the preservation of as many trees as possible. The design of buildings and roads should offset the effects of shrinking and swelling. The depth to conglomerate severely limits the functioning of septic tank absorption fields in areas of the Musserhill soil. If this unit is used as a site for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the restricted permeability. During the rainy season, however, the septic tank absorption fields may still fail to function properly. The slope is a management concern affecting the installation of septic tank absorption fields. Absorption lines should be installed on the contour. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Areas disturbed by construction activities are subject to erosion during the rainy season. Temporary erosion-control measures may be necessary. The Weaverville soil is susceptible to slumping, and disturbing the soil increases this hazard. The careful location of roads and construction sites helps to avoid the need for deep cuts and fills.

Oregon white oak and digger pine are the main tree species on the Musserhill soil. This soil can produce 18 cords of wood per acre from a stand of trees that average 8 inches in diameter at a height of 4.5 feet. The characteristic understory plant community on this soil is mainly buckbrush, greenleaf manzanita, brome, and bluegrass.

Douglas-fir, sugar pine, California black oak, and ponderosa pine are the main tree species on the Weaverville soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 107 for Douglas-fir. The CACTOS 50-year site index is 72.

The main concerns affecting the production and harvesting of timber on the Weaverville soil are the slope, a moderate risk of surface compaction, and the moderate hazard of erosion. The Weaverville soil also is limited by mass movement potential. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, can damage the roots of trees, and may reduce the growth or regeneration of seedlings planted later. Because of the potential for mass movement on the Weaverville soil, the careful location of roads and landings is necessary to help avoid the need for deep cuts and fills. Careful

management of reforestation is needed to reduce competition from undesirable plants and to provide partial shade for seedlings. Trees that are suitable for planting include Douglas-fir and ponderosa pine on the Weaverville soil. The characteristic understory plant community on the Weaverville soil is mainly greenleaf manzanita, whiteleaf manzanita, and deerbrush. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is IVe-1, nonirrigated.

**182—Musserhill-Weaverville complex, 30 to 50 percent slopes.** This map unit is on hills. Areas are dissected by perennial streams. The native vegetation is mainly hardwoods, brush, grass, and conifers on the Musserhill soil and is mainly conifers and some hardwoods and brush on the Weaverville soil. Elevation is 1,900 to 3,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Musserhill gravelly loam and 30 percent Weaverville loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Xeralfs and steep scarps from hydraulic mining, Dougcity gravelly loam, and Xerofluvents along stream channels under riparian hardwoods, such as willow and alder. Also included are small areas with piles of cobbles and gravel left from hydraulic mining and areas that have slopes of less than 30 percent. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Musserhill soil is moderately deep and is well drained. It formed in material weathered from weakly consolidated conglomerate. Typically, the surface is partially covered with a ½-inch mat of leaves, twigs, and grass stems. The surface layer is brown gravelly loam about 5 inches thick. The upper 6 inches of the subsoil is reddish brown very gravelly clay loam. The lower 21 inches is reddish brown extremely cobbly clay loam. Weakly consolidated conglomerate is at a depth of about 32 inches. The depth to weakly consolidated conglomerate ranges from 20 to 40 inches.

Permeability is moderately slow in the Musserhill soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Weaverville soil is very deep and is well drained. It formed in material weathered from weakly consolidated, moderately fine grained sediments. Typically, 10 to 15 percent of the surface is partially covered with gravel and cobbles and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is reddish brown loam about 4 inches thick. The upper 52 inches of the subsoil is yellowish red gravelly loam over yellowish red and red gravelly clay loam. The lower part of the subsoil to a depth of 81 inches or more is red very gravelly clay loam.

Permeability is moderately slow in the Weaverville soil. Available water capacity is high or very high. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for wood products, timber production, or homesite development.

Oregon white oak and digger pine are the main tree species on the Musserhill soil. This soil can produce 18 cords of wood per acre from a stand of trees that average 8 inches in diameter at a height of 4.5 feet. The characteristic understory plant community on the Musserhill soil is mainly buckbrush, greenleaf manzanita, brome, and bluegrass.

Douglas-fir, sugar pine, California black oak, and ponderosa pine are the main tree species on the Weaverville soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 107 for Douglas-fir. The CACTOS 50-year site index is 72.

The main concerns affecting the production and harvesting of timber on the Weaverville soil are the slope, a moderate risk of surface compaction, and the severe hazard of erosion. The Weaverville soil also is limited by mass movement potential. The use of conventional harvesting methods is limited by the slope. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, can damage the roots of trees, and can reduce the growth or regeneration of seedlings planted later. Because of the potential for mass movement on the Weaverville soil, the careful location of roads and landings is necessary to avoid the need for deep cuts and fills. Careful management of reforestation is needed to reduce competition from undesirable plants and to provide partial shade for seedlings. Trees that are suitable for planting on the Weaverville soil include Douglas-fir and ponderosa pine. The characteristic understory plant community on the Weaverville soil is mainly greenleaf manzanita, whiteleaf manzanita, and deerbrush. The understory vegetation provides cover and forage for wildlife.

If the Musserhill soil is used for homesite development, the main concerns are the depth to weakly consolidated conglomerate, a moderate shrink-

swell potential, the slope, and the moderately slow permeability. The cuts that are needed to provide essentially level building sites can expose the weakly consolidated conglomerate. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Plans for homesite development should provide for the preservation of as many trees as possible. The design of buildings and roads should offset the effects of shrinking and swelling. The depth to conglomerate severely limits the functioning of septic tank absorption fields.

If the Weaverville soil is used for homesite development, the main concerns are the moderately slow permeability, the slope, and the mass movement potential. This unit is susceptible to slumping, and disturbing the soil increases this hazard. The careful location of roads and construction sites is necessary to avoid the need for deep cuts and fills.

If these soils are used as sites for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the restricted permeability. During the rainy season, however, the septic tank absorption fields may still fail to function properly. The slope is a management concern affecting the installation of septic tank absorption fields. Absorption lines should be installed on the contour. Erosion is a hazard. Only the part of the site that is used for construction should be disturbed. Areas disturbed during construction are subject to erosion during the rainy season. Temporary erosion-control measures may be necessary.

The land capability classification is VIe, nonirrigated.

In an area north of Weaverville, this unit is mapped adjacent to the soil survey of the Shasta-Trinity National Forest Area. The delineations of these soils do not match those on the maps of the adjacent soil survey.

**183—Musserhill-Weaverville-Urban land complex, 9 to 30 percent slopes.** This map unit is on hills. Areas are dissected by perennial streams. The native vegetation is mainly hardwoods, brush, grass, and conifers on the Musserhill soil. It is mainly conifers and some hardwoods and brush on the Weaverville soil. Elevation is 2,000 to 3,100 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 35 percent Musserhill gravelly loam, 30 percent Weaverville clay loam, and 20 percent Urban land. The components occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Xeralfs; areas of Dougcity gravelly loam, 30 to 50 percent slopes; and areas of Xerofluvents along stream channels under woody streamside vegetation, such as willow and alder. Also included are small areas of steep scarps and piles of cobbles and gravel left by hydraulic mining; areas of Crefork clay loam; and areas that have slopes of less than 9 percent or more than 30 percent. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Musserhill soil is moderately deep and is well drained. It formed in material weathered from weakly consolidated clay conglomerate. Typically, the surface is partially covered with a ½-inch mat of leaves, twigs, and grass stems. The surface layer is brown gravelly loam about 5 inches thick. The upper 6 inches of the subsoil is reddish brown very gravelly clay loam. The lower 21 inches is reddish brown extremely cobbly clay loam. Weakly consolidated conglomerate is at a depth of about 32 inches. The depth to weakly consolidated conglomerate ranges from 20 to 40 inches.

Permeability is moderately slow in the Musserhill soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Weaverville soil is very deep and is well drained. It formed in material weathered from weakly consolidated, moderately fine grained sediments. Typically, 15 percent of the surface is partially covered with gravel and cobbles and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is reddish brown clay loam about 4 inches thick. The upper 52 inches of the subsoil is yellowish red gravelly loam over yellowish red and red gravelly clay loam. The lower part of the subsoil to a depth of 81 inches or more is red very gravelly clay loam.

Permeability is moderately slow in the Weaverville soil. Available water capacity is high or very high. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is moderate.

Urban land consists of areas covered with streets, parking lots, buildings, or sidewalks or areas that have been graded and in which the original soil has been cut or covered with fill material.

This unit is used for homesite development, urban development, or wood products. A few areas are used for timber production.

If this unit is used for homesite or urban development, the main concerns are the slope, the moderately slow permeability, and a moderate shrink-swell potential. The Musserhill soil also is limited by the depth to weakly consolidated conglomerate, and the Weaverville soil is limited by mass movement potential. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed during construction.

Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Plans for homesite development should provide for the preservation of as many trees as possible. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. Management measures that improve or maintain the plant cover and promote the accumulation of litter on the surface reduce the hazard of erosion and increase the rate of water infiltration. If this unit is used as a site for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the restricted permeability. During the rainy season, however, the septic tank absorption fields may still fail to function properly. The slope is a management concern affecting the installation of septic tank absorption fields. Absorption lines should be installed on the contour. The design of buildings and roads should offset the effects of shrinking and swelling. The depth to weakly consolidated conglomerate in the Musserhill soil severely restricts the functioning of septic tank absorption fields. Because of the potential for mass movement on the Weaverville soil, the careful location of roads and construction sites is necessary to avoid the need for deep cuts and fills. This unit is susceptible to slumping, and disturbing the soil increases this hazard.

Oregon white oak and digger pine are the main tree species on the Musserhill soil. This soil can produce 18 cords of wood per acre from a stand of trees that average 8 inches in diameter at a height of 4.5 feet. The characteristic understory plant community on the Musserhill soil is mainly buckbrush, greenleaf manzanita, brome, and bluegrass.

Douglas-fir, sugar pine, California black oak, and ponderosa pine are the main tree species on the Weaverville soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 107 for Douglas-fir. The CACTOS 50-year site index is 72.

The main concerns affecting the production and harvesting of timber on the Weaverville soil are the slope, a moderate risk of surface compaction, and the moderate hazard of erosion. This soil also is limited by the mass movement potential. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, can damage the roots of trees, and may reduce the growth or regeneration of seedlings planted later. Because of the potential for mass movement, the careful location of roads and landings is necessary to avoid the need for deep cuts and fills in the steeper areas. Careful management of reforestation is needed to reduce competition from undesirable plants and to provide partial shade for seedlings. Trees that are suitable for planting on the Weaverville soil include Douglas-fir and ponderosa pine. The characteristic understory plant community is mainly greenleaf manzanita, whiteleaf manzanita, and deerbrush. The understory vegetation provides cover and forage for wildlife.

The land capability classification of the Musserhill and Weaverville soils is IVe-1, nonirrigated, and that of the Urban land is VIII.

In an area north of Weaverville, this unit is mapped adjacent to the soil survey of the Shasta-Trinity National Forest Area. The delineations of this unit do not match those on the maps of the adjacent soil survey.

**184—Musserhill Variant loam, 30 to 50 percent slopes.** This moderately deep, well drained soil is on hills. It formed in material weathered from weakly consolidated conglomerate. The native vegetation is mainly hardwoods, brush, grass, and some conifers. Elevation is 2,000 to 2,600 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 57 to 60 degrees F, and the average frost-free period is 130 to 180 days.

Typically, 25 percent of the surface is partially covered with gravel and with a ½-inch mat of leaves, twigs, and grass stems. The surface layer is light yellowish brown loam about 4 inches thick. The upper 9 inches of the subsoil is light yellowish brown gravelly clay loam. The lower 19 inches is strong brown and brown very gravelly clay. Weakly consolidated conglomerate is at a depth of about 32 inches. The depth to weakly consolidated conglomerate ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Brownscreek gravelly loam, 50 to 75 percent slopes; Dougcity gravelly loam, 50 to 75 percent slopes; Weaverville clay loam, 30 to 50 percent slopes, under conifers; and areas of a very gravelly clay that is more than 40 inches deep and that supports mixed conifers. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is slow in the Musserhill Variant soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for wood products or homesite development.

Blue oak is the main tree species on this soil. The soil can produce 23 cords of wood per acre from a

stand of trees that average 14 inches in diameter at a height of 4.5 feet. The slope, the severe hazard of erosion, and a moderate risk of surface compaction limit accessibility for cutting wood and for other activities involving the use of equipment. Roads and landings can be protected against erosion by constructing water bars. The characteristic understory plant community is mainly bluegrass, deerbrush, and greenleaf manzanita. The understory vegetation provides cover and forage for wildlife.

If this soil is used for homesite development, the main concerns are the depth to weakly consolidated conglomerate, the severe hazard of erosion, a moderate shrink-swell potential, the slope, and the slow permeability. The cuts that are needed to provide essentially level building sites can expose the weakly consolidated conglomerate. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Plans for homesite development should provide for the preservation of as many trees as possible. The design of buildings and roads should offset the effects of shrinking and swelling. The depth to bedrock severely limits the functioning of septic tank absorption fields. If this soil is used as a site for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the restricted permeability. During the rainy season, however, the septic tank absorption fields may still fail to function properly. The slope is a management concern affecting the installation of septic tank absorption fields. Absorption lines should be installed on the contour. Erosion is a hazard. Only the part of the site that is used for construction should be disturbed. Areas disturbed by construction activities are subject to erosion during the rainy season. Temporary erosion-control measures may be necessary. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants.

The land capability classification is VIe, nonirrigated.

**185—Pardaloe-Dedrick association, 50 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly conifers, hardwoods, and brush on the Pardaloe soil and is mainly grass, brush, and scattered hardwoods and conifers on the Dedrick soil. Elevation is 2,000 to 4,500 feet. The average annual precipitation is 40 to 55 inches. The average annual air temperature is 50 to 57 degrees F in areas of the Pardaloe soil and 57 to 63 degrees F in areas of the Dedrick soil. The average frost-free period is 90 to 130 days.

This unit is 40 percent Pardaloe gravelly loam and 35 percent Dedrick very gravelly loam. The Pardaloe soil occurs mostly on north-facing slopes, and the Dedrick soil occurs mostly on south-facing slopes.

Included with these soils in mapping are small areas of Holkat Variant gravelly loam under dense oak thickets on north slopes; areas of Rock outcrop; Goulding very gravelly loam under canyon live oaks on north slopes; Brownbear very gravelly loam under conifers and oaks on southeast slopes; and Brockgulch very gravelly loam under canyon live oaks on south-facing slopes. Also included are small areas of Xerofluvents along stream channels under woody streamside vegetation, such as alders, oaks, and maples. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Pardaloe soil is deep or very deep and is well drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, 15 percent of the surface is partially covered with gravel and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is strong brown gravelly loam about 15 inches thick. The subsoil to a depth of 60 inches or more is brown very gravelly loam and extremely gravelly sandy clay loam.

Permeability is moderate in the Pardaloe soil. Available water capacity is low. The effective rooting depth is 40 to more than 60 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Dedrick soil is shallow and somewhat excessively drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, 60 percent of the surface is partially covered with gravel and 10 percent is covered with cobbles. The surface layer is dark yellowish brown very gravelly loam about 3 inches thick. The subsoil is yellowish brown extremely gravelly loam about 12 inches thick. Fractured schist is at a depth of about 15 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Dedrick soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Pardaloe soil is used for timber production, and the Dedrick soil is used as watershed land.

Douglas-fir, ponderosa pine, Oregon white oak, and Pacific madrone are the main tree species on the Pardaloe soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 114 for Douglas-fir. The CACTOS 50-year site index is 74.

The main limitations affecting the production and harvesting of timber on the Pardaloe soil are the slope, the severe hazard of erosion, and the limited available water capacity in the upper 24 inches. The slope limits the use of wheeled and tracked equipment in skidding

operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The moderate available water capacity reduces the seedling survival rate. Douglas-fir is suitable for planting. The characteristic understory plant community on the Pardaloe soil is mainly Oregon white oak, snowberry, swordfern, and poison-oak. Understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The careful management of watershed areas, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Most areas of the Dedrick soil support less than 10 percent tree canopy. The potential plant community is mainly buckbrush, birchleaf mountainmahogany, grasses, and scattered canyon live oak and digger pine. This vegetation provides food and cover for wildlife. Streamside vegetation also provides important habitat for wildlife. The natural vegetation is mainly brush. In areas where the Dedrick soil supports a canopy of trees, canyon live oak and digger pine are the main species. This soil can produce 24 cords of wood per acre from a stand of trees that average 10 inches in diameter at a height of 4.5 feet in areas where the canopy is more than 10 percent.

The land capability classification is VIIe, nonirrigated.

In an area north of Junction City, this unit is mapped adjacent to the soil survey of the Shasta-Trinity National Forest Area. The delineations of these soils do not match those on the maps of the adjacent soil survey.

**186—Pardaloe-Goulding complex, 50 to 75 percent slopes.** This map unit is on mountains, mostly on north-facing slopes. Areas are dissected by perennial streams. The native vegetation is mainly conifers, hardwoods, and brush on the Pardaloe soil and hardwoods, brush, and scattered conifers on the Goulding soil. Elevation is 1,500 to 4,000 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Pardaloe very gravelly loam and 30 percent Goulding very gravelly loam. The Pardaloe soil occurs mostly on sheltered slopes, and the Goulding soil occurs mostly on exposed slopes and spur ridges. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Brownbear very gravelly loam; areas of Rock outcrop; Bamtush extremely gravelly loam; Weaverville loam, 30 to 50 percent slopes, on broad ridgetops and old landslide deposits; and Xerofluvents along stream channels under conifers and woody streamside vegetation, such as alders, oaks, and some maples. Also included are small areas of Pardaloe and Goulding soils at elevations above 4,000 feet, where the mean annual air temperature is 45 to 50 degrees F and the average annual precipitation ranges from 55 to 65 inches. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Pardaloe soil is deep or very deep and is well drained. It formed in colluvium and material weathered from metavolcanic rocks. Typically, 30 percent of the surface is partially covered with gravel and with a 2-inch mat of moss-covered, decaying needles, twigs, leaves, and bark. The surface layer is brown very gravelly loam about 6 inches thick. The subsoil to a depth of 60 inches or more is brown and brownish yellow very gravelly loam and extremely gravelly sandy clay loam.

Permeability is moderate in the Pardaloe soil. Available water capacity is low. The effective rooting depth ranges from 40 to more than 60 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Goulding soil is shallow and somewhat excessively drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, 20 percent of the surface is partially covered with gravel and with a ½-inch mat of leaves and a few grass stems. The surface layer is brown very gravelly loam about 6 inches thick. The subsoil is dark yellowish brown extremely gravelly loam about 7 inches thick. Fractured metavolcanic bedrock is at a depth of about 13 inches.The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Goulding soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Pardaloe soil is used for timber production, and the Goulding soil is used as watershed land.

Douglas-fir, ponderosa pine, canyon live oak, sugar pine, Oregon white oak, and Pacific dogwood are the main tree species on the Pardaloe soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 114 for Douglas-fir. The CACTOS 50-year site index is 74.

The main concerns affecting the production and harvesting of timber on the Pardaloe soil are the severe hazard of erosion, the slope, and the limited available water capacity in the upper 24 inches. Proper design of road drainage systems and care in the placement of

culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. The low available water capacity of the Pardaloe soil and the shallow depth of the Goulding soil reduce the seedling survival rate in areas of this unit. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. Trees that are suitable for planting include Douglas-fir and ponderosa pine. The characteristic understory plant community on the Pardaloe soil is mainly poison-oak, western brackenfern, California hazel, and wild rose. Understory vegetation provides cover and forage for wildlife.

In areas where the Goulding soil supports a canopy of trees, canyon live oak, digger pine, and Pacific madrone are the main species. This soil can produce 23 cords of wood per acre from a stand of trees that average 7 inches in diameter at a height of 4.5 feet in areas where the canopy is more than 10 percent. Some areas support less than 10 percent tree canopy. In these areas the vegetation consists of canyon live oak, buckbrush, birchleaf mountainmahogany, greenleaf manzanita, digger pine, lemon ceanothus, and annual grasses. This vegetation provides cover and forage for wildlife.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff.

The land capability classification is VIIe, nonirrigated.

**188—Rock outcrop.** Rock outcrop consists of cliffs, ledges, and knobs of exposed bedrock. Except in a few isolated pockets of shallow soils, the Rock outcrop supports no vegetation. Elevation ranges from 1,400 to 6,974 feet.

Included in mapping are small areas of Dedrick very gravelly loam that support hardwoods. Also included are small areas of Rubble land. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

This unit is used as watershed areas, recreational areas, or wildlife habitat.

Rock outcrop provides denning, nesting, and sunning areas for wildlife, including raptors, mammals, and reptiles.

The land capability classification is VIII.

**189—Rock outcrop-Dedrick complex, 75 to 90 percent slopes.** This map unit is on mountain ridgetops. The native vegetation is mainly grass, brush, and scattered hardwoods and conifers. Elevation is 2,000 to 4,500 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is 57 to 63 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Rock outcrop and 35 percent Dedrick very gravelly loam. The Rock outcrop and the Dedrick soil occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Brockgulch very gravelly loam. Also included are areas of Holkat Variant gravelly loam, 50 to 75 percent slopes, that support dense thickets of California black oak and Oregon white oak. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Rock outcrop consists of cliffs, ledges, and knobs of exposed bedrock. Except in isolated pockets of shallow included soils, the Rock outcrop supports no vegetation.

The Dedrick soil is shallow and somewhat excessively drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, 60 percent of the surface is partially covered with gravel and 10 percent is covered with cobbles. The surface layer is dark yellowish brown very gravelly loam about 3 inches thick. The subsoil is yellowish brown extremely gravelly loam about 12 inches thick. Fractured schist is at a depth of about 15 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Dedrick soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used as watershed areas, recreational areas, or wildlife habitat.

The careful management of watershed land, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Most areas of the Dedrick soil support less than 10 percent tree canopy. The potential plant community is mainly buckbrush, birchleaf mountainmahogany, grasses, and scattered canyon live oak and digger pine. This vegetation provides food and cover for wildlife. Streamside vegetation also provides important habitat for wildlife. The natural vegetation is mainly brush. In areas where the Dedrick soil supports a canopy of trees, canyon live oak and digger pine are the main species. This soil can produce 24 cords of wood per acre from a stand of trees that average 10 inches in diameter at a height of 4.5 feet in areas where the canopy is more than 10 percent.

Rock outcrop provides denning, nesting, and sunning

areas for wildlife, including mammals, raptors, and reptiles.

The land capability classification of the Rock outcrop is VIII, and that of the Dedrick soil is VIIe, nonirrigated.

**190—Sheetiron extremely gravelly loam, 75 to 90 percent slopes.** This moderately deep, well drained soil is on mountains. It formed in colluvium and material weathered from mica schist. The native vegetation is mainly mixed conifers and hardwoods. Elevation is 3,500 to 4,300 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is 47 to 50 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 65 to 70 percent of the surface is partially covered with gravel and some cobbles and stones and with a 2-inch mat of leaves and twigs mixed with rock fragments. The surface layer is yellowish brown extremely gravelly loam about 4 inches thick. The subsoil is yellowish brown very gravelly loam about 15 inches thick. The substratum is light yellowish brown extremely gravelly loam about 5 inches thick. Fractured mica schist is at a depth of about 24 inches. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Barpeak very gravelly loam, areas of Rock outcrop, areas of shallow extremely gravelly loam that support canyon live oak, and areas of Brownscreek gravelly loam. Also included are small areas that have slopes of less than 75 percent and areas of Sheetiron very gravelly loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Sheetiron soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is very severe.

This unit is used for timber production.

Ponderosa pine, Douglas-fir, sugar pine, canyon live oak, and California black oak are the main tree species on this soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 104 for ponderosa pine and 80 for Douglas-fir (McArdle and Meyer, 1961). The CACTOS 50-year site index is 60.

The main concerns affecting the production and harvesting of timber are the slope, the hazard of erosion, and the very low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. The surface of the soil tends to form a crust after it is disturbed. The crust reduces the rate of water infiltration and increases the runoff rate. It can also increase the hazard of erosion. Because of a potential for soil creeping, the careful location of roads and landings is necessary to avoid the need for deep cuts and fills. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Careful management of reforestation is needed to reduce competition from undesirable plants and to provide partial shade for seedlings. The very low available water capacity, the gravel on the surface, and the south-facing slopes reduce the seedling survival rate. Trees that are suitable for planting include ponderosa pine, Douglas-fir, and sugar pine. The characteristic understory plant community is mainly deervetch, lupine, shrub tanoak, and shrub live oak. The understory vegetation provides cover and forage for wildlife.

The land capability classification is VIIe, nonirrigated.

**191—Sheetiron-Barpeak complex, 50 to 90 percent slopes.** This map unit is on south- and west-facing mountain slopes. Areas are dissected by perennial streams. The native vegetation is mainly mixed conifers. Elevation is 2,400 to 5,400 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 55 percent Sheetiron very gravelly loam and 25 percent Barpeak very gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Brownscreek gravelly loam, Dougcity gravelly loam, Beargulch very gravelly loam, and Skyrock extremely gravelly loam. Also included are small areas of shallow very gravelly loam; areas of deep very gravelly loam that has a thick, dark surface layer; areas of moderately deep very gravelly loam that is underlain by soft, weathered mica schist; areas of Xerofluvents and Riverwash along stream channels under woody streamside vegetation; Springgulch gravelly clay loam, 30 to 50 percent slopes, under brush; and Caris extremely gravelly sandy loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Sheetiron soil is moderately deep and is well drained. It formed in colluvium and material weathered from mica schist. Typically, 35 percent of the surface is partially covered with gravel, 10 percent is covered with cobbles, and 3 percent is covered with stones and with a 2-inch mat of needles, leaves, twigs, cones, and

branches. The surface layer is yellowish brown very gravelly loam about 4 inches thick. The upper part of the subsoil is yellowish brown very gravelly loam about 15 inches thick. The lower part of the subsoil is light yellowish brown extremely gravelly loam about 5 inches thick. Fractured mica schist is at a depth of about 24 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Sheetiron soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is very severe.

The Barpeak soil is very deep and is well drained. It formed in colluvium derived from mica schist. Typically, 25 percent of the surface is partially covered with gravel and with a 2-inch mat of needles, leaves, twigs, cones, and branches. The surface layer is yellowish brown very gravelly loam about 3 inches thick. The upper 5 inches of the subsoil is brown very gravelly sandy loam. The lower part of the subsoil and the substratum to a depth of 60 inches or more are light yellowish brown and brown extremely gravelly sandy loam and pink extremely gravelly sandy clay loam.

Permeability is moderate in the Barpeak soil. Available water capacity is very low or low. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is very severe.

This unit is used for timber production.

Ponderosa pine, sugar pine, Douglas-fir, canyon live oak, and California black oak are the main tree species on the Sheetiron soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 104 for ponderosa pine and 80 for Douglas-fir (McArdle and Meyer, 1961). The CACTOS 50-year site index is 60.

Douglas-fir, sugar pine, ponderosa pine, canyon live oak, and California black oak are the main tree species on the Barpeak soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 116 for Douglas-fir and 110 for ponderosa pine (Meyer, 1938). The CACTOS 50-year site index is 73.

The main concerns affecting the production and harvesting of timber are the slope, the hazard of erosion, and the very low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. The surface of these soils tends to form a crust after it is disturbed. The crust reduces the rate of water infiltration and increases the runoff rate. It can also increase the hazard of erosion. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars, by seeding fills, and by other means. Soils on steep slopes adjacent to drainageways are susceptible to mass movement. Disturbances in these areas should be minimized. Careful management of reforestation is needed to reduce competition from undesirable plants and to provide partial shade for seedlings. The very low available water capacity of the Sheetiron soil, the pebbles on the surface, and the steep south-facing slopes reduce the seedling survival rate. The very low or low available water capacity of the Barpeak soil also reduces the seedling survival rate. Trees that are suitable for planting include ponderosa pine and sugar pine. The characteristic understory plant community on the Sheetiron soil is mainly deervetch, lupine, shrub tanoak, and shrub live oak. The characteristic understory plant community on the Barpeak soil is mainly shrub live oak, deervetch, shrub tanoak, lupine, and western brackenfern. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIIe, nonirrigated.

**192—Sheetiron Variant-Dedrick complex, 50 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly hardwoods, grass, and brush. Elevation is 1,700 to 3,200 feet. The average annual precipitation is 40 to 50 inches. The average annual air temperature is 52 to 57 degrees F in areas of the Sheetiron Variant soil and 57 to 63 degrees F in areas of the Dedrick soil. The average frost-free period is 90 to 130 days.

This unit is 45 percent Sheetiron Variant gravelly loam and 35 percent Dedrick very gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Sheetiron very gravelly loam, Barpeak very gravelly loam, Brownscreek gravelly loam, and Dougcity gravelly loam. These included areas support conifers. They make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Sheetiron Variant soil is moderately deep and is well drained. It formed in colluvium and material weathered from mica schist. Typically, 15 percent of the surface is partially covered with gravel and cobbles and with a 2-inch mat of leaves, needles, and twigs. The surface layer is strong brown gravelly loam about 2 inches thick. The upper 16 inches of the subsoil is strong brown gravelly clay loam. The lower 13 inches is

strong brown very gravelly clay loam. Fractured mica schist is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderately slow in the Sheetiron Variant soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Dedrick soil is shallow and somewhat excessively drained. It formed in residuum and colluvium derived from mica schist. Typically, 60 percent of the surface is partially covered with gravel and 10 percent is covered with cobbles. The surface layer is dark yellowish brown very gravelly loam about 3 inches thick. The subsoil is yellowish brown extremely gravelly loam about 12 inches thick. Fractured schist bedrock is at a depth of about 15 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Dedrick soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used for wood products or as watershed areas, recreational areas, or wildlife habitat.

Oregon white oak, California black oak, scattered Douglas-fir, and ponderosa pine are the main tree species on the Sheetiron Variant soil. This soil can produce 13 cords of wood per acre from a stand of trees that average 8 inches in diameter at a height of 4.5 feet. The characteristic understory plant community on the Sheetiron Variant soil is mainly deerbrush, whiteleaf manzanita, needlegrass, mountain brome, and Idaho fescue. The understory vegetation provides cover and forage for wildlife.

Most areas of the Dedrick soil support less than 10 percent tree canopy. The potential plant community on the Dedrick soil is mainly Oregon white oak, buckbrush, soft chess, bulbous oniongrass, and silver hairgrass. The natural vegetation is mainly noncommercial hardwoods, brush, and grass because of the very low available water capacity and the shallow depth to bedrock. The diverse vegetation in areas of this unit provides valuable habitat for deer and other wildlife.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the severe hazard of erosion, disturbance of the soil should be kept to a minimum. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Straw mulching also is effective.

The land capability classification is VIIe, nonirrigated.

**193—Skyrock extremely gravelly loam, 50 to 75 percent slopes.** This shallow, somewhat excessively drained soil is on mountains. It formed in residuum and colluvium derived from mica schist. The native vegetation is mainly brush. Elevation is 4,500 to 5,800 feet. The average annual precipitation is 60 to 75 inches, the average annual air temperature is 43 to 45 degrees F, and the average frost-free period is 70 to 90 days.

Typically, 80 percent of the surface is partially covered with gravel mixed with leaves. The surface layer is light yellowish brown extremely gravelly loam about 4 inches thick. The upper 6 inches of the subsoil is light yellowish brown very gravelly loam. The lower 8 inches is light yellowish brown and yellow extremely gravelly sandy clay loam. Fractured mica schist is at a depth of about 18 inches. The depth to bedrock ranges from 10 to 20 inches.

Included with this soil in mapping are small areas of Beargulch very gravelly loam, Sheetiron very gravelly loam, and Barpeak very gravelly loam. These included areas support conifers. They make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderate in the Skyrock soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used as watershed areas, recreational areas, or wildlife habitat.

The careful management of watershed land, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the severe hazard of erosion, disturbance of the soil should be kept to a minimum. The potential plant community is mainly shrub tanoak, canyon live oak, and whitethorn ceanothus. This vegetation provides cover and forage for wildlife. The natural vegetation is mainly brush.

The land capability classification is VIIe, nonirrigated.

**194—Skyrock-Rock outcrop complex, 50 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly brush. Elevation is 5,300 to 6,600 feet. The average annual precipitation is 70 to 75 inches, the average annual air temperature is 43 to 45 degrees F, and the average frost-free period is 70 to 90 days.

This unit is 55 percent Skyrock extremely gravelly loam and 25 percent Rock outcrop. The Skyrock soil and the Rock outcrop occur as areas so intricately intermingled that it was not practical to map them

separately at the scale used.

Included in mapping are small areas of dark yellowish brown very gravelly loam that is 20 to 40 inches deep over bedrock; areas of Rubble land; and areas of Beargulch very gravelly loam that support conifers. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Skyrock soil is shallow and somewhat excessively drained. It formed in residuum and colluvium derived from mica schist. Typically, 65 percent of the the surface is partially covered with gravel and cobbles and with a 1-inch mat of leaves and twigs. The surface layer is light yellowish brown extremely gravelly loam about 4 inches thick. The underlying material also is light yellowish brown extremely gravelly loam. It is about 14 inches thick. Fractured mica schist is at a depth of about 18 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Skyrock soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

Rock outcrop consists of barren, exposed knobs and ledges of hard bedrock. Except in isolated pockets of shallow soils, the Rock outcrop supports no vegetation.

This unit is used as watershed land, recreational areas, or wildlife habitat.

The careful management of watershed areas, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the severe hazard of erosion, disturbance of the soil should be kept to a minimum. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Straw mulching also is effective. The potential plant community on the Skyrock soil is mainly greenleaf manzanita, whitethorn ceanothus, deerbrush, and Brewer oak. The natural vegetation is mainly brush. This natural vegetation provides cover and forage for wildlife.

This unit provides important high-elevation summer habitat for deer and other wildlife. The Rock outcrop provides denning, nesting, and sunning areas for wildlife, including raptors, mammals, and reptiles.

The land capability classification of the Skyrock soil is VIIe, nonirrigated, and that of the Rock outcrop is VIII.

**195—Skyrock Variant-Rock outcrop complex, 30 to 50 percent slopes.** This map unit is on mountains. The native vegetation is mainly conifers and brush. Elevation is 4,500 to 5,500 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is 45 to 47 degrees F, and the average frost-free period is 70 to 90 days.

This unit is 60 percent Skyrock Variant very stony loam and 20 percent Rock outcrop. The Skyrock Variant soil and the Rock outcrop occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Sheetiron very gravelly loam, Barpeak very gravelly loam, Minersville Variant fine gravelly loamy coarse sand, Marpa very gravelly sandy clay loam, and Hoosimbim extremely gravelly sandy loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Skyrock Variant soil is shallow and well drained. It formed in colluvium derived from ultrabasic rocks. Typically, 82 percent of the surface is partially covered with gravel, cobbles, stones, and boulders mixed with some scattered needles, leaves, and twigs. The surface layer is yellowish brown very stony loam about 3 inches thick. The subsoil is yellowish brown extremely cobbly loam and extremely cobbly clay loam about 10 inches thick. Fractured ultrabasic rock is at a depth of about 13 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Skyrock Variant soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe.

Rock outcrop consists of barren, exposed cliffs, knobs, and ledges of hard bedrock. Except in isolated pockets of shallow soils, the Rock outcrop supports no vegetation.

This unit is used as watershed land or wildlife habitat. It also is used for limited timber production.

Western white pine and California red fir are the main tree species on the Skyrock Variant soil. On the basis of a 50-year site curve (Schumacher, 1926), the mean site index is 21 for California red fir. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 34 for western white pine. Because of the low basal area and extent of the main commercial species on this soil, yields commonly are only 60 percent of those of normal stands.

The main concerns affecting the production and harvesting of timber are the slope, the severe hazard of erosion, the shallow depth to bedrock, and the very low available water capacity. The slope limits the kinds of equipment that can be used. Minimizing the risk of erosion is essential when timber is harvested. Proper design of road drainage systems and care in the

placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Trees are subject to windthrow because of the limited rooting depth. The very low available water capacity reduces the seedling survival rate. Trees that are suitable for planting include California red fir and western white pine. The characteristic understory plant community is mainly serviceberry, gooseberry, and lupine. The understory vegetation provides cover and forage for wildlife.

Rock outcrop provides denning, nesting, and sunning areas for wildlife, including raptors, mammals, and reptiles.

The land capability classification of the Skyrock Variant soil is VIe, nonirrigated, and that of the Rock outcrop is VIII.

**196—Skyrock Variant-Rock outcrop-Rubble land complex, 50 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly conifers and brush. Elevation is 4,500 to 6,000 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is 45 to 47 degrees F, and the average frost-free period is 70 to 90 days.

This unit is 50 percent Skyrock Variant very stony loam, 15 percent Rock outcrop, and 15 percent Rubble land. The components of the unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Marpa very gravelly sandy clay loam, Hoosimbim extremely gravelly sandy loam, Sheetiron very gravelly loam, and Barpeak very gravelly loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Skyrock Variant soil is shallow and well drained. It formed in colluvium derived from ultrabasic rocks. Typically, 82 percent of the surface is partially covered with gravel, cobbles, stones, and boulders mixed with some scattered needles, leaves, and twigs. The surface layer is yellowish brown very stony loam about 3 inches thick. The subsoil is yellowish brown extremely cobbly loam and extremely cobbly clay loam about 10 inches thick. Fractured ultrabasic rock is at a depth of about 13 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Skyrock Variant soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

Rock outcrop consists of barren, exposed cliffs, knobs, and ledges of hard bedrock. Except in isolated pockets of shallow included soils, the Rock outcrop supports no vegetation.

Rubble land consists of areas covered with colluvial boulders, stones, cobbles, and gravel. These areas are dominantly barren, except for lichen and some annual grasses. The are irregularly shaped, and the slopes are not stabilized. Downslope movement is likely.

This unit is used as watershed land or wildlife habitat. It also is used for limited timber production.

Western white pine and California red fir are the main tree species on the Skyrock Variant soil. On the basis of a 50-year site curve (Schumacher, 1926), the mean site index is 21 for California red fir. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 34 for western white pine. Because of the low basal area and extent of the main commercial species on this soil, yields commonly are only 60 percent of those of normal stands.

The main concerns affecting the production and harvesting of timber are the slope, the severe hazard of erosion, the shallow depth to bedrock, and the very low available water capacity. The use of conventional harvesting methods is difficult because of the slope and the stones on the surface. Minimizing the risk of erosion is essential when timber is harvested. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Trees are subject to windthrow because of the limited rooting depth. The very low available water capacity reduces the seedling survival rate. Trees that are suitable for planting include California red fir and western white pine. The characteristic understory plant community is mainly serviceberry, gooseberry, and lupine. The understory vegetation provides cover and forage for wildlife.

Rock outcrop and Rubble land provide denning, nesting, and sunning areas for wildlife, including raptors, mammals, and reptiles. The areas of Rubble land are not stable.

The land capability classification of the Skyrock Variant is VIIe, nonirrigated, and that of the Rock outcrop and the Rubble land is VIII.

**197—Springgulch-Brockgulch Variant complex, 30 to 50 percent slopes.** This map unit is on south-facing mountains and spur ridges. The native vegetation is mainly brush. Elevation is 2,400 to 3,100 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 57 to 62 degrees F, and the average frost-free period is 130 to 180 days.

This unit is 60 percent Springgulch gravelly clay loam

and 25 percent Brockgulch Variant loam. The Springgulch soil is on mountain slopes, and the Brockgulch Variant soil is on spur ridges. The two soils occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included with these soils in mapping are small areas of Brownscreek gravelly loam and Dougcity gravelly loam on mountains under conifers and areas of shallow gravelly clay loam. Also included are small areas of Xerofluvents along ephemeral stream channels. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Springgulch soil is very deep and is well drained. It formed in colluvium and material weathered from mica schist. Typically, the surface layer is reddish brown gravelly clay loam about 7 inches thick. The upper 43 inches of the subsoil is reddish brown or yellowish red gravelly clay loam. The lower 25 inches is red very gravelly clay loam.

Permeability is moderately slow in the Springgulch soil. Available water capacity is high or very high. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

The Brockgulch Variant soil is moderately deep and is well drained. It formed in material weathered from mica schist. Typically, the surface is partially covered with a 1-inch mat of leaves and twigs. The surface layer is reddish brown loam about 2 inches thick. The upper 3 inches of the subsoil is reddish brown gravelly clay loam. The lower 26 inches is yellowish red very gravelly clay loam and very gravelly loam. Fractured mica schist bedrock is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Brockgulch Variant soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used as watershed areas, recreational areas, or wildlife habitat.

The careful management of watershed areas, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the severe hazard of erosion, disturbance of the soil should be kept to a minimum. The potential plant community on this unit is mainly chamise, greenleaf manzanita, wavyleaf ceanothus, whiteleaf manzanita, and chaparral oak. This vegetation provides cover and forage for wildlife. The potential plant community is mainly brush because of the high soil temperatures on south- and west-facing slopes. If windrowing is considered, care should be taken to avoid removal of the surface soil because nutrients are concentrated in the surface layer. The removal of the surface layer reduces the seedling survival rate and hinders productivity. Constructing windrows on the contour helps to prevent the erosion resulting from the concentration of surface runoff. Extending the windrow piles entirely across the cleared slope helps to catch the surface runoff. Erosion can be minimized by reducing the downslope distance between windrow piles.

If these soils are used for homesite development, the main concerns are the slope and the severe hazard of erosion. The Springgulch soil also is limited by the moderately slow permeability, and the Brockgulch Variant soil is limited by the depth to bedrock. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. The removal of gravel and cobbles in disturbed areas is needed for landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. If these soils are used as sites for septic tank absorption fields, the restricted permeability can be overcome by increasing the size of the absorption field. The slope is a concern affecting the installation of septic tank absorption fields. Absorption lines should be installed on the contour. The depth to bedrock in areas of the Brockgulch Variant soil severely limits the functioning of septic tank absorption fields. The design of access roads should provide stable cut and fill slopes, and drains are needed to control surface runoff and keep soil losses to a minimum. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads can be protected against erosion by constructing water bars and by seeding fills. Soils on steep slopes adjacent to drainageways are susceptible to mass movement. Disturbances in these areas should be kept to a minimum.

The land capability classification is VIe, nonirrigated.

**198—Tallowbox-Minersville complex, 30 to 50 percent slopes.** This map unit is on mountains. The native vegetation is mainly mixed conifers, hardwoods, and brush on the Tallowbox soil and is mainly conifers, a few hardwoods, and brush on the Minersville soil. Elevation is 2,400 to 3,000 feet. The average annual precipitation is 55 to 65 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 60 percent Tallowbox gravelly coarse sandy loam and 20 percent Minersville sandy loam. The Tallowbox soil is on exposed slopes dominated by

ponderosa pine and oaks, and the Minersville soil is on sheltered slopes dominated by Douglas-fir. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas, on ridgetops, of gravelly sandy loam that is 10 to 20 inches deep over weathered granitic rock; areas of Valcreek very gravelly loamy coarse sand; and small areas of Haploxerolls, 2 to 9 percent slopes, on small alluvial fans along drainageways. Also included are Xerofluvents along drainageways under woody streamside vegetation, such as alder and willow; Tallowbox and Minersville soils that have slopes of more than 50 percent or less than 30 percent; and areas that have been affected by moderate sheet, rill, and gully erosion. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Tallowbox soil is moderately deep and is well drained. It formed in material weathered from granitic rock. Typically, the surface is partially covered with a 2-inch mat of needles, leaves, twigs, and cones. The surface layer is dark grayish brown and light brownish gray gravelly coarse sandy loam about 9 inches thick. The subsoil is light brownish gray and pale brown gravelly coarse sandy loam about 14 inches thick. Weathered granitic rock is at a depth of about 23 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderately rapid in the Tallowbox soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is very severe.

The Minersville soil is deep and well drained. It formed in residuum and colluvium derived from granitic rock. Typically, the surface is partially covered with a 2-inch mat of needles, twigs, cones, and branches. The surface layer is pale brown sandy loam about 5 inches thick. The subsoil is very pale brown sandy loam and fine gravelly coarse sandy loam about 25 inches thick. The substratum is light gray and very pale brown very gravelly coarse sandy loam about 13 inches thick. Weathered granitic rock is at a depth of about 43 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderately rapid in the Minersville soil. Available water capacity is low or moderate. The effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is very severe.

This unit is used for timber production.

Ponderosa pine, Douglas-fir, California black oak, and sugar pine are the main tree species on the Tallowbox soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 89 for ponderosa pine. The CACTOS 50-year site index is 58.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and white fir are the main tree species on the Minersville soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 101 for Douglas-fir. The CACTOS 50-year site index is 69.

The main concerns affecting the production and harvesting of timber are the slope, the hazard of erosion, and the low available water capacity. The slope limits the kinds of equipment that can be used. Minimizing the risk of erosion is essential when timber is harvested. The highlead logging method is more efficient than most other methods and causes less damage to the surface. Areas of these soils occur adjacent to stream channels. Disturbances in these areas can cause severe streambank erosion. Also, these areas have high surface runoff from areas upslope, and disturbances that expose bare soil can cause gullying. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars, by seeding fills, and by other means. Straw mulching also is effective. Maintaining the understory vegetation is essential for the control of erosion. The low or very low available water capacity reduces the seedling survival rate. Trees that are suitable for planting include ponderosa pine and sugar pine on the Tallowbox soil and Douglas-fir and ponderosa pine on the Minersville soil. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The characteristic understory plant community on the Tallowbox soil is mainly whiteleaf manzanita, shrub live oak, poison-oak, and western brackenfern. The characteristic understory plant community on the Minersville soil is mainly shrub live oak, iris, needlegrass, and western brackenfern. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. The installation and functioning of septic tank absorption fields are severely limited by the slope.

The land capability classification is VIIe, nonirrigated.

**199—Tallowbox-Minersville complex, 50 to 75 percent slopes.** This map unit is on mountains. Areas

are dissected by perennial streams. The native vegetation is mainly mixed conifers, hardwoods, and brush on the Tallowbox soil and is mainly conifers, a few hardwoods, and brush on the Minersville soil. Elevation is 2,100 to 4,600 feet. The average annual precipitation is 40 to 65 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 55 percent Tallowbox gravelly coarse sandy loam and 25 percent Minersville sandy loam. The Tallowbox soil is on exposed slopes dominated by ponderosa pine and oaks, and the Minersville soil is on sheltered slopes dominated by Douglas-fir. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas, on ridgetops, of gravelly sandy loam that is 10 to 20 inches deep over weathered granitic rock; areas of Valcreek very gravelly loamy coarse sand; small areas of Haploxerolls, 2 to 9 percent slopes, on small alluvial fans; and areas of Xerofluvents along drainageways under woody streamside vegetation, such as alder and willow. Also included are Tallowbox and Minersville soils that have slopes of less than 50 percent and areas that have been affected by moderate sheet, rill, and gully erosion. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Tallowbox soil is moderately deep and is well drained. It formed in material weathered from granitic rocks. Typically, the surface is partially covered with a 2-inch mat of needles, leaves, twigs, and cones. The surface layer is dark grayish brown and light brownish gray fine gravelly coarse sandy loam about 9 inches thick. The subsoil is light brownish gray and pale brown gravelly coarse sandy loam about 14 inches thick. Weathered granitic rock is at a depth of about 23 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderately rapid in the Tallowbox soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is very severe.

The Minersville soil is deep and well drained. It formed in residuum and colluvium derived from granitic rock. Typically, the surface is partially covered with a 2-inch mat of needles, twigs, cones, and branches. The surface layer is pale brown sandy loam about 5 inches thick. The subsoil is very pale brown sandy loam and fine gravelly coarse sandy loam about 25 inches thick. The substratum is light gray and very pale brown very gravelly coarse sandy loam about 13 inches thick. Weathered granitic rock is at a depth of about 43 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderately rapid in the Minersville soil. Available water capacity is low or moderate. The effective rooting depth is 40 to 60 inches. Runoff is very rapid, and the hazard of water erosion is very severe.

This unit is used for timber production.

Ponderosa pine, Douglas-fir, California black oak, and sugar pine are the main tree species on the Tallowbox soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 89 for ponderosa pine. The CACTOS 50-year site index is 58.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and white fir are the main tree species on the Minersville soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 101 for Douglas-fir. The CACTOS 50-year site index is 69.

The main concerns affecting the production and harvesting of timber are the slope, the hazard of erosion, and the low available water capacity. The slope limits the kinds of equipment that can be used. Minimizing the risk of erosion is essential when timber is harvested. The highlead logging method is more efficient than most other methods and causes less damage to the surface. Areas of these soils occur adjacent to stream channels. Disturbances in these areas can cause severe streambank erosion. Also, these areas are highly susceptible to surface runoff from areas upslope, and disturbances that expose bare soil can cause gullying. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars, by seeding fills, and by other means. Straw mulching also is effective. Maintaining the understory vegetation is essential for the control of erosion. The low or very low available water capacity reduces the seedling survival rate. Trees that are suitable for planting include ponderosa pine and sugar pine on the Tallowbox soil and Douglas-fir and ponderosa pine on the Minersville soil. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The characteristic understory plant community on the Tallowbox soil is mainly whiteleaf manzanita, shrub live oak, poison-oak, and western brackenfern. The characteristic understory plant community on the Minersville soil is mainly shrub live oak, iris, needlegrass, and western brackenfern. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. The installation and functioning of septic tank absorption fields are severely limited by the slope.

The land capability classification is VIIe, nonirrigated.

**201—Urban land-Xeralfs complex, 5 to 30 percent slopes.** This map unit is on hills and terraces in areas that have been disturbed by mining activities and by urban development. Slopes are variable and range from 5 to 30 percent. Areas are dissected by perennial streams. The native vegetation is mainly conifers and hardwoods. Elevation is 1,800 to 2,200 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 40 percent Urban land and 40 percent Xeralfs. The components of the unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Weaverville clay loam that support conifers, areas of Musserhill gravelly loam that support hardwoods, and areas that have slopes of more than 30 percent. Also included are small areas of Xerofluvents along stream channels under woody streamside vegetation. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Urban land consists of areas that are covered with streets, parking lots, buildings, or sidewalks or areas that have been graded and in which the original soil has been cut or covered with other soil material.

Xeralfs consist of well drained soils of varying depths. These soils formed in alluvium from mixed rock sources and from weakly consolidated nonmarine sediments. Areas of these soils have been disturbed by hydraulic mining activities, and much of the soil has been removed in places. The resulting eroded areas have textures and colors that are variable. A reference pedon has a surface layer of strong brown very gravelly clay loam about 1 inch thick. The subsoil is red extremely gravelly clay loam about 22 inches thick. The substratum is reddish yellow extremely gravelly clay loam about 7 inches thick. Weakly consolidated sedimentary rock is at a depth of about 30 inches. The depth to weakly consolidated sedimentary deposits ranges from 10 to 60 inches.

Permeability is very slow to moderate in the Xeralfs. Available water capacity is very low to moderate. The effective rooting depth is 10 to 60 inches. Runoff is rapid, and the hazard of water erosion is moderate or severe.

This unit is used for homesite or urban development.

Because of the variable nature of this unit, onsite investigation is necessary to determine the suitability for development. Areas disturbed by construction activities are subject to erosion during the rainy season. Temporary erosion-control measures may be necessary. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Plans for homesite development should provide for the preservation of as many trees as possible. The design of access roads should provide stable cut and fill slopes, and drains are needed to control surface runoff and keep soil losses to a minimum. The removal of gravel and cobbles in disturbed areas is needed for landscaping, particularly in areas used for lawns.

Streamside vegetation provides important habitat for wildlife.

The land capability classification of the Urban land is VIII, and that of the Xeralfs is VIIs, nonirrigated.

**202—Valcreek-Choop complex, 30 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly brush, conifers, hardwoods, and grasses on the Valcreek soil and is mainly brush on the Choop soil. Some areas of the Choop soil are barren. Elevation is 3,000 to 5,000 feet. The average annual precipitation is 55 to 65 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Valcreek very gravelly loamy coarse sand and 30 percent Choop fine gravelly loamy coarse sand. The Valcreek soil is on exposed slopes, and the Choop soil is on exposed ridgetops. About 30 percent of the unit consists of barren areas that are actively eroding. These areas have been disturbed by their use as haul roads, landings, or skid trails. Rills and gullies have formed where runoff has concentrated. The Valcreek and Choop soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of very shallow very gravelly coarse sand on barren ridgetops and areas of Rock outcrop on ridgetops. Also included are small areas of Haploxerolls, 2 to 9 percent slopes, on small alluvial fans; Choop soils, on ridgetops, that have scattered stones and boulders on the surface; and Xerofluvents along drainageways under woody

streamside vegetation, such as alder and willow. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Valcreek soil is moderately deep and is excessively drained. It formed in material weathered from granitic rocks. Typically, the surface is partially covered with a 3-inch mat of needles, twigs, leaves, and cones. The surface layer is pale brown very gravelly loamy coarse sand about 3 inches thick. The lower part of the surface layer and the upper part of the underlying material are pale brown and very pale brown fine gravelly loamy coarse sand about 13 inches thick. The lower part of the underlying material is very pale brown extremely gravelly loamy coarse sand about 15 inches thick. Weathered granitic rock is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is rapid in the Valcreek soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is rapid or very rapid, and the hazard of water erosion is very severe.

The Choop soil is shallow and excessively drained. It formed in material weathered from granitic rocks. Typically, 50 percent of the surface is partially covered with fine gravel. The surface layer is dark grayish brown or gray fine gravelly loamy coarse sand about 5 inches thick. The underlying material to a depth of 16 inches is variegated grayish brown to very pale brown very gravelly loamy coarse sand and extremely gravelly loamy coarse sand. Soft, weathered granitic rock is at a depth of about 16 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is rapid in the Choop soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid or very rapid, and the hazard of water erosion is very severe.

This unit is used for timber production or as watershed areas, recreational areas, or wildlife habitat.

Ponderosa pine, canyon live oak, Douglas-fir, and sugar pine are the main tree species on the Valcreek soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 75 for ponderosa pine. Because of the low basal area and extent of the main commercial species on this soil, yields commonly are only 80 percent of those of normal stands. The CACTOS 50-year site index is 51.

The main concerns affecting the production and harvesting of timber on the Valcreek soil are the slope, the hazard of erosion, and the very low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. The highlead logging method is more efficient than most other methods and causes less damage to the surface. Minimizing the risk of erosion is essential in the harvesting of timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars, by seeding fills, and by other means. Straw mulching also is effective. Areas of these soils occur adjacent to stream channels. Disturbances in these areas can cause severe streambank erosion. Also, these areas are highly susceptible to surface runoff from areas upslope, and disturbances that expose bare soil can cause gullying. Maintaining the understory vegetation is essential for the control of erosion. The very low available water capacity reduces the seedling survival rate. Trees that are suitable for planting on the Valcreek soil include ponderosa pine and sugar pine. The characteristic understory plant community on this soil is mainly shrub tanoak, squawcarpet, greenleaf manzanita, and shrub live oak. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the very severe hazard of erosion, disturbance of the soil should be kept to a minimum (fig. 4). The Choop soil is used as watershed land. It produces vegetation that provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife. The potential plant community on the Choop soil is mainly shrub tanoak, greenleaf manzanita, and chaparral oak. The natural vegetation is mainly brush.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. The installation and functioning of septic tank absorption fields are severely limited by the slope.

The land capability classification is VIIe, nonirrigated.

**203—Valcreek-Minersville complex, 30 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly brush, conifers, hardwoods, and grasses on the Valcreek soil and is mainly conifers, hardwoods, and brush on the Minersville soil. Elevation is 3,000 to 5,000 feet. The average annual precipitation is 55 to 65 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 50 percent Valcreek very gravelly loamy

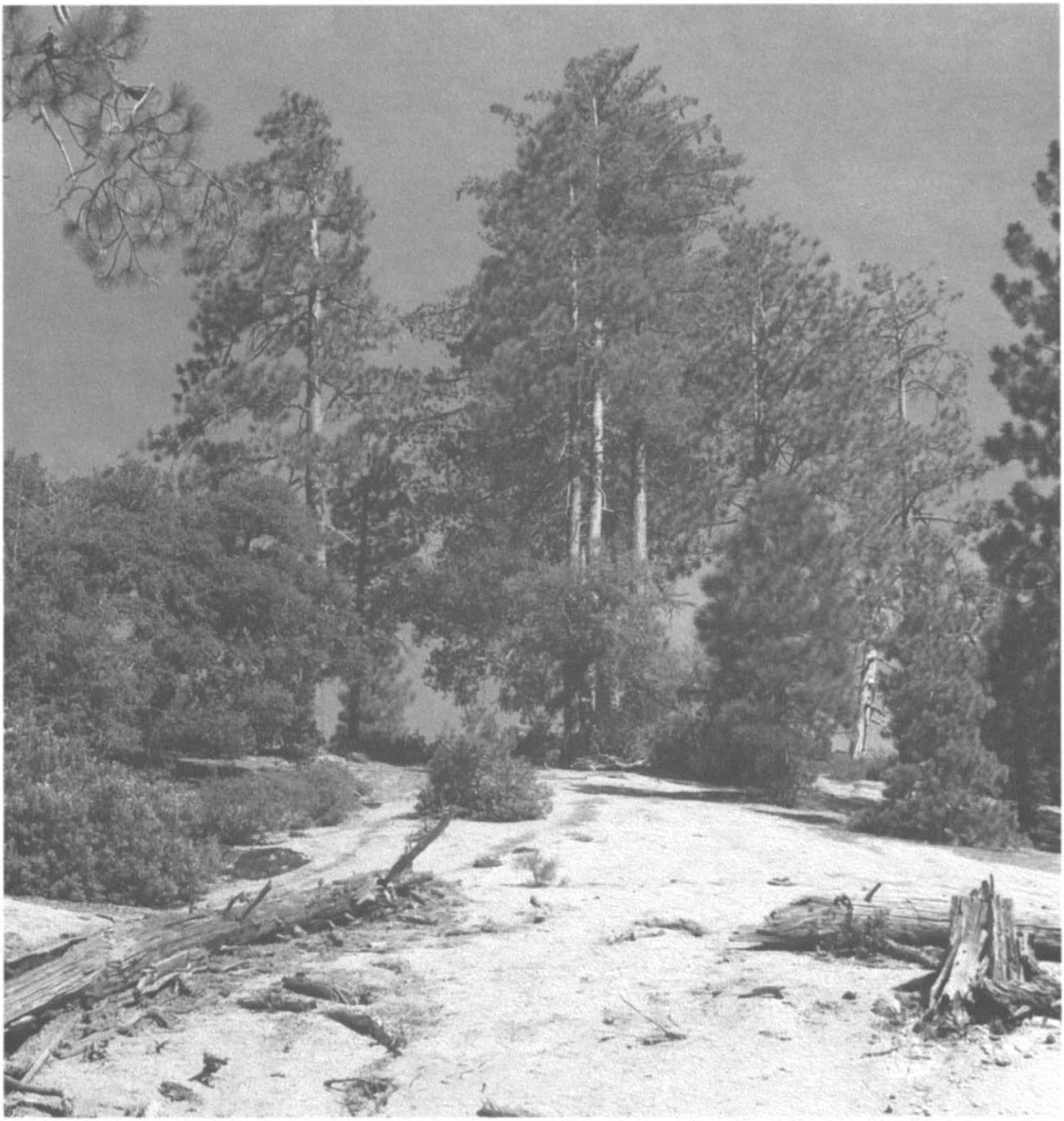


**Figure 4.—This unprotected area of Valcreek-Choop complex, 30 to 75 percent slopes, is highly susceptible to erosion.**

coarse sand and 30 percent Minersville sandy loam.

The Valcreek soil is on exposed slopes, and the

Minersville soil is on sheltered slopes. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Choop fine gravelly loamy coarse sand throughout the unit; Xerofluvents along drainageways under woody streamside vegetation, such as alder and willow; and small areas of Haploxerolls, 2 to 9 percent slopes, on small alluvial fans along drainageways. Also included are areas that have been affected by moderate sheet, rill, and gully erosion. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Valcreek soil is moderately deep and is excessively drained. It formed in material weathered from granitic rocks. Typically, the surface is partially covered with a 3-inch mat of needles, twigs, leaves, and cones. The surface layer is pale brown very gravelly loamy coarse sand about 3 inches thick. The lower part of the surface layer and the upper part of the underlying material are pale brown and very pale brown fine gravelly loamy coarse sand about 13 inches thick. The lower part of the underlying material is very pale brown extremely gravelly loamy coarse sand about 15 inches thick. Weathered granitic rock is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is rapid in the Valcreek soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is rapid or very rapid, and the hazard of water erosion is very severe.

The Minersville soil is deep and well drained. It formed in residuum and colluvium derived from granitic rocks. Typically, the surface is partially covered with a 2-inch mat of needles, twigs, cones, and branches. The surface layer is pale brown sandy loam about 5 inches thick. The subsoil is very pale brown sandy loam and fine gravelly coarse sandy loam about 25 inches thick. The substratum is light gray and very pale brown very gravelly coarse sandy loam about 13 inches thick. Weathered granitic rock is at a depth of about 43 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderately rapid in the Minersville soil. Available water capacity is low or moderate. The effective rooting depth is 40 to 60 inches. Runoff is rapid or very rapid, and the hazard of water erosion is very severe.

This unit is used for timber production.

Ponderosa pine, canyon live oak, Douglas-fir, and sugar pine are the main tree species on the Valcreek soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 75 for ponderosa pine. Because of the low basal area and extent of the main commercial species on this soil, yields commonly are only 80 percent of those of normal stands. The CACTOS 50-year site index is 51.

Douglas-fir, ponderosa pine, sugar pine, white fir, and California black oak are the main tree species on the Minersville soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 101 for Douglas-fir. The CACTOS 50-year site index is 69.

The main concerns affecting the production and harvesting of timber are the slope, the hazard of erosion, and the low or very low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. The highlead logging method is more efficient than most other methods and causes less damage to the surface. Minimizing the risk of erosion is essential in the harvesting of timber. Areas of these soils occur adjacent to stream channels. Disturbances in these areas can cause severe streambank erosion. Also, these areas are highly susceptible to surface runoff from areas upslope, and disturbances that expose bare soil can cause gullying. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars, by seeding fills, and by other means. Straw mulching also is effective. Maintaining the understory vegetation is essential for the control of erosion. The low or very low available water capacity reduces the seedling survival rate. Trees that are suitable for planting include ponderosa pine and sugar pine on the Valcreek soil and Douglas-fir and ponderosa pine on the Minersville soil. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The characteristic understory plant community on the Valcreek soil is mainly shrub tanoak, squawcarpet, greenleaf manzanita, and shrub live oak. The characteristic understory plant community on the Minersville soil is mainly shrub live oak, iris, needlegrass, manzanita, and western brackenfern. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. The installation and functioning of septic tank absorption fields are severely limited by the slope.

The land capability classification is VIIe, nonirrigated.

**204—Valcreek-Minersville-Choop complex, 30 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly brush, conifers, hardwoods, and grasses on the Valcreek soil. It is mostly conifers, a few hardwoods, and brush on the Minersville soil. It is mainly brush on the Choop soil, and some areas are barren. Elevation is 2,500 to 5,000 feet. The average annual precipitation is 55 to 65 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 35 percent Valcreek very gravelly loamy coarse sand, 25 percent Minersville sandy loam, and 20 percent Choop fine gravelly loamy coarse sand. The Valcreek soil is on exposed slopes, the Minersville soil is on sheltered slopes, and the Choop soil is on exposed ridgetops. About 20 percent of the unit is barren and actively eroding. The barren areas have been disturbed by their use as haul roads, landings, or skid trails. Rills and gullies have formed in areas where runoff has concentrated. The Valcreek, Minersville, and Choop soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of very shallow very gravelly coarse sand on barren ridgetops and areas of Rock outcrop on ridgetops. Also included are small areas of Haploxerolls, 2 to 9 percent slopes, on small alluvial fans; Choop soils that have scattered stones and boulders on the surface, on ridgetops; and Xerofluvents along drainageways under riparian hardwoods, such as alder and willow. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Valcreek soil is moderately deep and is excessively drained. It formed in material weathered from granitic rock. Typically, the surface is partially covered with a 3-inch mat of needles, twigs, leaves, and cones. The upper part of the surface layer is pale brown very gravelly loamy coarse sand about 3 inches thick. The lower part of the surface layer and the upper part of the underlying material are pale brown and very pale brown fine gravelly loamy coarse sand about 13 inches thick. The lower part of the underlying material is very pale brown extremely gravelly loamy coarse sand about 15 inches thick. Weathered granitic rock is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is rapid in the Valcreek soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is very severe.

The Minersville soil is deep and well drained. It formed in residuum and colluvium derived from granitic rock. Typically, the surface is partially covered with a 2-inch mat of needles, twigs, cones, and branches. The surface layer is pale brown sandy loam about 5 inches thick. The subsoil is very pale brown sandy loam and fine gravelly coarse sandy loam about 25 inches thick. The substratum is light gray and very pale brown very gravelly coarse sandy loam about 13 inches thick. Weathered granitic rock is at a depth of 43 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderately rapid in the Minersville soil. Available water capacity is low or moderate. The effective rooting depth is 40 to 60 inches. Runoff is rapid or very rapid, and the hazard of water erosion is very severe.

The Choop soil is shallow and excessively drained. It formed in material weathered from granitic rock. Typically, 50 percent of the surface is partially covered with fine gravel. The surface layer is dark grayish brown or gray fine gravelly loamy coarse sand about 5 inches thick. The underlying material is variegated grayish brown to very pale brown very gravelly loamy coarse sand and extremely gravelly loamy coarse sand about 11 inches thick. Soft, weathered granitic rock is at a depth of about 16 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is rapid in the Choop soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid or very rapid, and the hazard of water erosion is very severe.

This unit is used mainly for timber production. Some areas are used as watershed areas, recreational areas, or wildlife habitat.

Ponderosa pine, canyon live oak, Douglas-fir, and sugar pine are the main tree species on the Valcreek soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 75 for ponderosa pine. Because of the low basal area and extent of the main commercial species on this soil, yields commonly are only 80 percent of those of normal stands. The CACTOS 50-year site index for the Valcreek soil is 51.

Douglas-fir, ponderosa pine, sugar pine, white fir, and California black oak are the main tree species on the Minersville soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 101 for Douglas-fir. The CACTOS 50-year site index is 69.

The main concerns affecting the production and harvesting of timber on the Valcreek and Minersville soils are the slope, the hazard of erosion, and the low or very low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. The highlead logging method is more efficient than most other methods and causes less damage to the surface. Minimizing the risk of erosion is

essential when timber is harvested. Areas of these soils occur adjacent to stream channels. Disturbances in these areas can cause severe streambank erosion. Also, these areas are highly susceptible to surface runoff from areas upslope, and disturbances that expose bare soil can cause gullying. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars, by seeding fills, and by other means. Straw mulching also is effective. Maintaining the understory vegetation is essential for the control of erosion. The low available water capacity reduces the seedling survival rate. Trees that are suitable for planting include ponderosa pine and sugar pine on the Valcreek soil and Douglas-fir and ponderosa pine on the Minersville soil. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The characteristic understory plant community on the Valcreek soil is mainly shrub tanoak, squawcarpet, greenleaf manzanita, and shrub live oak. The characteristic understory plant community on the Minersville soil is mainly shrub live oak, iris, needlegrass, manzanita, and western brackenfern. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

Careful management of watershed land, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the very severe hazard of erosion, disturbance of the soil should be kept to a minimum. The Choop soil produces vegetation that provides cover and forage for wildlife. The potential plant community on the Choop soil is mainly greenleaf manzanita, shrub tanoak, sierra chinkapin, and squawcarpet. The native vegetation is mainly brush because of the very low available water capacity and the shallow depth to bedrock.

The land capability classification is VIIe, nonirrigated.

**205—Vanvor-Hoosimbim complex, 30 to 50 percent slopes.** This map unit is on mountains. The native vegetation is mainly hardwoods, brush, and scattered conifers on the Vanvor soil. It is mainly conifers and hardwoods on the Hoosimbim soil. Elevation is 1,800 to 2,500 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Vanvor very gravelly sandy clay loam and 35 percent Hoosimbim extremely gravelly sandy loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Marpa very gravelly sandy clay loam under conifers, Vitzthum extremely gravelly loam, and Dougcity gravelly loam. Also included are small areas of paved roadways on cuts and fills. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Vanvor soil is moderately deep and is well drained. It formed in colluvium derived from metavolcanic rocks. Typically, 30 percent of the surface is partially covered with gravel and with a 1-inch mat of leaves, twigs, and needles. The surface layer is brown very gravelly sandy clay loam about 6 inches thick. The upper 18 inches of the subsoil is strong brown very gravelly sandy clay loam or very gravelly clay loam. The lower 7 inches is extremely gravelly clay loam. Fractured schist bedrock is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Vanvor soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Hoosimbim soil is deep and well drained. It formed in residuum and colluvium derived from metavolcanic rocks. Typically, 50 percent of the surface is partially covered with angular gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is yellowish brown extremely gravelly sandy loam about 4 inches thick. The upper 12 inches of the subsoil is brown and light brown very gravelly sandy clay loam. The lower 26 inches is reddish yellow extremely gravelly sandy clay loam. Fractured metavolcanic rock is at a depth of about 42 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderate in the Hoosimbim soil. Available water capacity is very low or low. The effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Vanvor soil is used as watershed areas, recreational areas, or wildlife habitat. The Hoosimbim soil is used for timber production.

Careful management of watershed land, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. In areas where the Vanvor soil supports a canopy of trees, Oregon white oak, canyon live oak, and digger pine are the main species. This soil can produce 57 cords of wood per acre from a stand of trees that average 9 inches in diameter at a height of

4.5 feet. Some areas of the Vanvor soil support less than 10 percent tree canopy. The characteristic understory plant community on the Vanvor soil is mainly shrub live oak and greenleaf manzanita. The understory vegetation provides cover and forage for wildlife.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and Pacific madrone are the main tree species on the Hoosimbim soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 102 for Douglas-fir. The CACTOS 50-year site index is 66.

The main concerns affecting the production and harvesting of timber on the Hoosimbim soil are the slope, the moderate hazard of erosion, and the very low or low available water capacity. The use of conventional harvest methods is difficult because of the slope. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Careful management of reforestation is needed to reduce competition from undesirable understory plants. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Trees that are suitable for planting include Douglas-fir, ponderosa pine, and sugar pine. The characteristic understory plant community on the Hoosimbim soil is mainly California hazel, poison-oak, snowberry, shrub live oak, whitethorn ceanothus, and squawcarpet. The understory vegetation provides cover and forage for wildlife.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. The installation and functioning of septic tank absorption fields are severely limited by the slope and by the moderate depth to bedrock of the Vanvor soil.

The land capability classification is VIe, nonirrigated.

**206—Vanvor-Hoosimbim complex, 50 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly hardwoods and conifers on the Vanvor soil and mixed conifers on the Hoosimbim soil. Elevation is 2,400 to 3,000 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Vanvor very gravelly sandy clay loam and 35 percent Hoosimbim extremely gravelly sandy loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Marpa very gravelly sandy clay loam, Vitzthum extremely gravelly loam, and Dougcity gravelly loam. Also included are small areas used as paved roadway on cuts and fills. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Vanvor soil is moderately deep and is well drained. It formed in colluvium derived from metavolcanic rocks. Typically, 30 percent of the surface is partially covered with gravel and with a 1-inch mat of leaves and twigs. The surface layer is brown very gravelly sandy clay loam about 6 inches thick. The upper 18 inches of the subsoil is strong brown very gravelly sandy clay loam and very gravelly clay loam. The lower 7 inches is strong brown extremely gravelly clay loam. Fractured schist is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Vanvor soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Hoosimbim soil is deep and well drained. It formed in residuum and colluvium derived from metavolcanic and some metasedimentary rocks. Typically, 50 percent of the surface is partially covered with angular gravel and with a 2-inch mat of needles, leaves, twigs, branches, and cones. The surface layer is yellowish brown extremely gravelly sandy loam about 4 inches thick. The upper 12 inches of the subsoil is brown and light brown very gravelly sandy clay loam. The lower 26 inches is reddish yellow extremely gravelly sandy clay loam. Fractured metavolcanic rock is at a depth of about 42 inches. The depth to bedrock ranges from 40 to 60 inches.

Permeability is moderate in the Hoosimbim soil. Available water capacity is very low or low. The effective rooting depth is 40 to 60 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Vanvor soil is used as watershed areas, recreational areas, or wildlife habitat. The Hoosimbim soil is used for timber production.

Careful management of watershed land, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. In areas where the Vanvor soil supports a canopy of trees, Oregon white oak, canyon live oak, and digger pine are the main species. This soil can produce 57 cords of wood per acre from a stand of trees that average 9 inches in diameter at a height of 4.5 feet. Some areas of the Vanvor soil support less than 10 percent tree canopy. The characteristic

understory plant community on the Vanvor soil is mainly shrub live oak and greenleaf manzanita. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

Douglas-fir, ponderosa pine, sugar pine, California black oak, and Pacific madrone are the main tree species on the Hoosimbim soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 102 for Douglas-fir. The CACTOS 50-year site index is 66.

The main concerns affecting the production and harvesting of timber on the Hoosimbim soil are the slope, the severe hazard of erosion, and the very low or low available water capacity. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Careful management of reforestation is needed to reduce competition from undesirable understory plants. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Trees that are suitable for planting include Douglas-fir, ponderosa pine, and sugar pine. The characteristic understory plant community on the Hoosimbim soil is mainly California hazel, poison-oak, snowberry, shrub live oak, whitethorn ceanothus, and squawcarpet. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIIe, nonirrigated.

**207—Vitzthum-Cargent complex, 50 to 75 percent slopes.** This map unit is on mountains. The native vegetation is mainly brush and hardwoods. Elevation is 2,000 to 4,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 57 to 62 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 50 percent Vitzthum very gravelly loam and 30 percent Cargent very gravelly sandy clay loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Springgulch gravelly clay loam, Sheetiron very gravelly loam under conifers, Rock outcrop, Barpeak very gravelly loam under conifers, and gravelly clay loam that is 10 to 20 inches deep over bedrock. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Vitzthum soil is shallow and somewhat excessively drained. It formed in material weathered from mica schist. Typically, 5 to 10 percent of the surface is partially covered with gravel, cobbles, and stones and with a 2-inch mat of leaves and twigs. The surface layer is yellowish brown very gravelly loam about 6 inches thick. The subsoil and substratum are strong brown very gravelly loam and brownish yellow extremely gravelly loam about 12 inches thick. Fractured mica schist is at a depth of about 18 inches. The depth to bedrock ranges from 10 to 20 inches.

Permeability is moderate in the Vitzthum soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Cargent soil is moderately deep and is well drained. It formed in colluvium and material weathered from mica schist. Typically, 60 percent of the surface is partially covered with gravel and with a 1-inch mat of leaves and twigs. The surface layer is brown very gravelly sandy clay loam about 3 inches thick. The upper 18 inches of the subsoil is light brown very gravelly clay loam. The lower 11 inches is light brown extremely gravelly loam. Fractured mica schist is at a depth of about 32 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Cargent soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used as watershed areas, recreational areas, or wildlife habitat.

Careful management of watershed land, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Because of the severe hazard of erosion, disturbance of the soil should be kept to a minimum. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads can be protected against erosion by constructing water bars and by seeding fills. Straw mulching also is effective. The potential plant community on the Vitzthum soil is mainly greenleaf manzanita, canyon live oak, and birchleaf mountainmahogany. The natural vegetation is mainly brush. The potential plant community on the Cargent soil is mainly chaparral oak, deerbrush, Oregon white oak, and annual grasses. The natural vegetation is mainly brush. The diverse vegetation on this unit provides cover and forage for deer and other wildlife.

The land capability classification is VIIe, nonirrigated.

**208—Weaverville loam, 9 to 30 percent slopes.** This very deep, well drained soil is on hills. It formed in residuum and colluvium derived from weakly consolidated, moderately fine grained sediments. Areas are dissected by perennial streams. The native vegetation is mainly mixed conifers and hardwoods. Elevation is 1,800 to 3,500 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 10 to 15 percent of the surface is partially covered with gravel and cobbles and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is reddish brown loam about 4 inches thick. The upper 52 inches of the subsoil is yellowish red gravelly loam over yellowish red and red gravelly clay loam. The lower part of the subsoil to a depth of 81 inches or more is red very gravelly clay loam.

Included with this soil in mapping are small areas of Crefork clay loam, areas that have slopes of less than 9 percent, clay soils that are 20 to 40 inches deep over weakly consolidated mudstone, and areas of very gravelly clay loam that is more than 40 inches deep. Also included are small areas of Xerofluvents along stream channels under woody streamside vegetation, such as willow and alder, and areas that have been used as paved or dirt roads. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately slow in the Weaverville soil. Available water capacity is high or very high. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used for homesite development or timber production.

If this soil is used for homesite development, the main concerns are the slope, a moderate shrink-swell potential, the moderately slow permeability, and the mass movement potential. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Plans for homesite development should provide for the preservation of as many trees as possible. The design of buildings and roads should offset the effects of shrinking and swelling. If this soil is used as a site for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the moderately slow permeability. During the rainy season, however, the septic tank absorption fields may still fail to function properly. The slope is a concern affecting the installation of septic tank absorption fields. Absorption lines should be installed on the contour. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Areas disturbed by construction activities are subject to erosion during the rainy season. Temporary erosion-control measures may be necessary. Cutbanks are not stable and are subject to slumping. Because of the potential for mass movement, the careful location of roads and construction sites is necessary to avoid the need for deep cuts and fills. The design of access roads should provide stable cut and fill slopes, and drains are needed to control surface runoff and keep soil losses to a minimum.

Douglas-fir, sugar pine, California black oak, and ponderosa pine are the main tree species on this soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 107 for Douglas-fir. The CACTOS 50-year site index is 72.

The main concerns affecting the production and harvesting of timber are a risk of surface compaction and the potential for mass movement. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, can damage the roots of trees, and may reduce the growth or regeneration of seedlings planted later. Because of the potential for mass movement, the careful location of roads and landings is necessary to avoid the need for deep cuts and fills. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Trees that are suitable for planting include Douglas-fir, sugar pine, and ponderosa pine. The characteristic understory plant community is mainly greenleaf manzanita, whiteleaf manzanita, and deerbrush. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is IVe-1, nonirrigated.

**209—Weaverville loam, 30 to 50 percent slopes.** This very deep, well drained soil is on hills. It formed in residuum and colluvium derived from weakly consolidated, moderately fine grained sediments. Areas are dissected by perennial streams. The native vegetation is mainly mixed conifers and hardwoods. Elevation is 1,800 to 3,500 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

Typically, 10 to 15 percent of the surface is partially covered with gravel and cobbles and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is reddish brown loam about 4 inches thick. The upper 52 inches of the subsoil is yellowish red gravelly loam over yellowish red and red gravelly clay loam. The

lower part of the subsoil to a depth of 81 inches or more is red very gravelly clay loam.

Included with this soil in mapping are small areas of Crefork clay loam, areas that have slopes of less than 15 percent, areas of clay soils that are 20 to 40 inches deep over weakly consolidated mudstone, and areas of very gravelly clay loam that is more than 40 inches deep over bedrock. Also included are small areas of Xerofluvents along stream channels under woody streamside vegetation, such as willow and alder, and areas that have been used as paved or dirt roads. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability is moderately slow in the Weaverville soil. Available water capacity is high or very high. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for homesite development or timber production.

If this soil is used for homesite development, the main concerns are the slope, the severe hazard of erosion, a moderate shrink-swell potential, the moderately slow permeability, and the mass movement potential. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Plans for homesite development should provide for the preservation of as many trees as possible. The design of buildings and roads should offset the effects of shrinking and swelling. If this soil is used as a site for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the moderately slow permeability. During the rainy season, however, the septic tank absorption fields may still fail to function properly. The slope is a concern affecting the installation of septic tank absorption fields. Absorption lines should be installed on the contour. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Areas disturbed by construction activities are subject to erosion during the rainy season. Temporary erosion-control measures may be necessary. Cutbanks are not stable and are subject to slumping.

Douglas-fir, sugar pine, California black oak, and ponderosa pine are the main tree species on this soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 107 for Douglas-fir. The CACTOS 50-year site index is 72.

The main concerns affecting the production and harvesting of timber are a risk of surface compaction, the severe hazard of erosion, the slope, and the potential for mass movement. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, can damage the roots of trees, and may reduce the growth or regeneration of seedlings planted later. Because of the potential for mass movement, the careful location of roads and landings is necessary to avoid the need for deep cuts and fills. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. The use of conventional harvest methods is difficult because of the slope. Trees that are suitable for planting include Douglas-fir, sugar pine, and ponderosa pine. The characteristic understory plant community is mainly greenleaf manzanita, whiteleaf manzanita, and deerbrush. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIe, nonirrigated.

**210—Weitchpec-Dubakella complex, 30 to 50 percent slopes.** This map unit is on mountains. The native vegetation is mainly mixed conifers. Elevation is 1,600 to 2,500 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 55 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 50 percent Weitchpec gravelly loam and 30 percent Dubakella cobbly clay loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Demogul gravelly loam, Dougcity gravelly loam, and Bamtush extremely gravelly loam; areas of shallow very gravelly loam; and areas of deep and very deep very gravelly loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Weitchpec soil is moderately deep and is well drained. It formed in material weathered from serpentinitic rocks. Typically, 15 percent of the surface is partially covered with gravel and cobbles and with a 1-inch mat of needles, leaves, and twigs. The surface layer and the subsoil are brown and light brown gravelly loam about 10 inches thick. The substratum is pink very gravelly loam about 19 inches thick. Serpentinitic rock is at a depth of about 29 inches. The depth to bedrock ranges from 20 to 40 inches.

Permeability is moderate in the Weitchpec soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Dubakella soil is moderately deep and is well drained. It formed in material weathered from serpentinitic and other ultrabasic rocks. Typically, 25 percent of the surface is partially covered with cobbles and gravel and with a 1-inch mat of needles, twigs, cones, and branches. The surface layer is reddish

brown cobbly clay loam about 5 inches thick. The subsoil is yellowish red very cobbly clay loam and strong brown and yellowish red very cobbly clay about 29 inches thick. Fractured, serpentinitic ultrabasic rock is at a depth of about 34 inches. The cracks in the rock are lined with clay films. The depth to bedrock ranges from 20 to 40 inches.

Permeability is slow in the Dubakella soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for timber production or homesite development.

Douglas-fir, incense cedar, California black oak, Jeffrey pine, and sugar pine are the main tree species on the Weitchpec soil. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 81 for Douglas-fir. The CACTOS 50-year site index is 57.

Jeffrey pine, incense cedar, and Douglas-fir are the main tree species on the Dubakella soil. On the basis of a 100-year site curve (Meyer, 1938), the mean site index is 71 for Jeffrey pine. Because of the low basal area and extent of the main commercial species, yields commonly are only 80 percent of those of normal stands. The CACTOS 50-year site index for the Dubakella soil is 49.

The main concerns affecting the production and harvesting of timber are the severe hazard of erosion, the potential for mass movement, the slope, and the low available water capacity. The use of conventional harvest methods is difficult because of the slope. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Road failures and landslides are likely after road construction or clearcutting. Because of a potential for slumping in areas of the Dubakella soil, the careful location of roads and landings is necessary to avoid the need for deep cuts and fills. The careful management of reforestation is needed after harvesting to reduce competition from undesirable understory plants. The droughtiness of the surface layer of the Weitchpec soil reduces the seedling survival rate. If reforestation is considered, species that are tolerant of serpentinitic soil conditions should be selected. Jeffrey pine is suitable for planting. The characteristic understory plant community on this unit is mainly buckbrush, bluegrass, manzanita, and serviceberry. The understory vegetation provides cover and forage for wildlife.

The slope is a major concern if these soils are used for homesite development. Extensive cutting and filling generally are required. The cutslopes are susceptible to excessive erosion. Measures that provide intensive control of runoff are needed. The installation and functioning of septic tank absorption fields are severely limited by the slope.

The land capability classification is VIe, nonirrigated.

**211—Weitchpec Variant-Bamtush Variant complex, 9 to 50 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly conifers and some hardwoods and brush. Elevation is 2,000 to 4,400 feet. The average annual precipitation is 55 to 65 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Weitchpec Variant gravelly loam, 30 to 50 percent slopes; 20 percent Bamtush Variant very gravelly loam, 30 to 50 percent slopes; and 20 percent Bamtush Variant loam, 9 to 30 percent slopes. Bamtush Variant loam is on old landslides.

Included with these soils in mapping are small areas of Dubakella stony loam on ridgetops under oaks and brush; areas of gravelly clay loam and clay that are more than 60 inches deep over bedrock; areas of moderately deep very gravelly loam; areas of deep gravelly loam; and areas of Rock outcrop on ridgetops. Also included are small areas of Weitchpec Variant and Bamtush Variant soils that have slopes of more than 50 percent and areas of Xerofluvents along drainageways under woody streamside vegetation, such as alder and willow. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Weitchpec Variant soil is deep and well drained. It formed in residuum and colluvium derived from peridotite and other ultrabasic rocks. Typically, 10 percent of the surface is partially covered with gravel and a few stones and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is brown and light yellowish brown gravelly loam about 9 inches thick. The subsoil is yellowish brown and light yellowish brown very gravelly clay loam about 21 inches thick. The substratum is light yellowish brown extremely gravelly clay loam about 18 inches thick. Fractured ultrabasic rock is at a depth of about 48 inches. Some soil material is in the cracks in the rock. The depth to bedrock ranges from 40 to more than 60 inches.

Permeability is moderately slow in the Weitchpec Variant soil. Available water capacity is low or moderate. The effective rooting depth ranges from 40 to more than 60 inches. Runoff is rapid, and the hazard of water erosion is severe.

Bamtush Variant very gravelly loam is very deep and is well drained. It formed in residuum and colluvium

derived from peridotite and other ultrabasic rocks. Typically, 20 percent of the surface is partially covered with cobbles, gravel, and a few stones and with a 2-inch mat of needles, twigs, bark, and leaves. The surface layer is yellowish red very gravelly loam about 6 inches thick. The upper 9 inches of the subsoil is yellowish red very gravelly loam. The lower 54 inches is yellowish red very gravelly clay loam and extremely gravelly clay loam. The substratum to a depth of 78 inches or more is yellowish red extremely gravelly clay.

Bamtush Variant loam is very deep and is well drained. It formed in residuum and colluvium derived from peridotite and other ultrabasic rocks. Typically, 20 percent of the surface is partially covered with cobbles, gravel, and a few stones and with a 2-inch mat of needles, twigs, bark, and leaves. The surface layer is yellowish red loam about 6 inches thick. The upper 9 inches of the subsoil is yellowish red very gravelly loam. The lower 54 inches is yellowish red very gravelly clay loam and extremely gravelly clay loam. The substratum to a depth of 78 inches or more is yellowish red extremely gravelly clay.

Permeability is moderate in the two Bamtush Variant soils in this unit. Available water capacity is low or moderate. The effective rooting depth is more than 60 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used for timber production.

Douglas-fir, sugar pine, ponderosa pine, incense cedar, and California black oak are the main tree species on this unit. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 100 for Douglas-fir on the Weitchpec Variant soil and 101 for Douglas-fir on the Bamtush Variant soils. The CACTOS 50-year site index for the unit is 68.

The main concerns affecting the production and harvesting of timber in areas that have slopes of 30 to 50 percent are the moderate or severe hazard of erosion, the slope, the low available water capacity, and the potential for mass movement. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, can damage the roots of trees, and may reduce the growth or regeneration of seedlings planted later. Because of the potential for mass movement in areas of the Bamtush Variant soils, the careful location of roads and landings is necessary to avoid the need for deep cuts and fills. The slope limits the kinds of equipment that can be used. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Trees that are suitable for planting include Douglas-fir and ponderosa pine. The characteristic understory plant community on this unit is mainly western brackenfern, serviceberry, poison-oak, and canyon live oak. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

If this unit is used for homesite development, the main limitation is the potential for mass movement. The soils are susceptible to slumping, and disturbing them increases this hazard. Excavation for roads and buildings increases the hazard of erosion.

The land capability classification is VIe, nonirrigated.

**212—Weitchpec Variant-Bamtush Variant complex, 50 to 75 percent slopes.** This map unit is on mountains. Areas are dissected by perennial streams. The native vegetation is mainly conifers and some hardwoods and brush. Elevation is 2,000 to 4,400 feet. The average annual precipitation is 55 to 65 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 90 to 130 days.

This unit is about 45 percent Weitchpec Variant gravelly loam and 35 percent Bamtush Variant very gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of Dubakella stony loam on ridgetops under oaks and brush; areas of moderately deep very gravelly loam; areas of deep gravelly loam; areas of Rock outcrop on ridgetops; small areas of Weitchpec Variant and Bamtush Variant soils that have slopes of less than 50 percent; and areas of Xerofluvents along drainageways under woody streamside vegetation, such as alder and willow. Also included are areas that are nearly barren and have an eroded surface. These areas have been disturbed by their use as haul roads, skid trails, or landings. Rills and gullies have formed where runoff has concentrated. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Weitchpec Variant soil is deep and well drained. It formed in residuum and colluvium derived from peridotite and other ultrabasic rocks. Typically, 10 percent of the surface is partially covered with gravel and a few stones and with a 1-inch mat of needles, leaves, twigs, and cones. The surface layer is brown and light yellowish brown gravelly loam about 9 inches thick. The subsoil is yellowish brown and light yellowish brown very gravelly clay loam about 21 inches thick. The substratum is light yellowish brown extremely gravelly clay loam about 18 inches thick. Fractured

ultrabasic rock is at a depth of about 48 inches. Some soil material is in the cracks in the rock. The depth to bedrock ranges from 40 to more than 60 inches.

Permeability is moderately slow in the Weitchpec Variant soil. Available water capacity is low or moderate. The effective rooting depth ranges from 40 to more than 60 inches. Runoff is very rapid, and the hazard of water erosion is severe.

The Bamtush Variant soil is very deep and is well drained. It formed in residuum and colluvium derived from peridotite and other ultrabasic rocks. Typically, 20 percent of the surface is partially covered with cobbles, gravel, and a few stones and with a 2-inch mat of needles, twigs, bark, and leaves. The surface layer is yellowish red very gravelly loam about 6 inches thick. The upper 9 inches of the subsoil is yellowish red very gravelly loam. The lower 54 inches is yellowish red very gravelly clay loam and extremely gravelly clay loam. The substratum to a depth of 78 inches or more is yellowish red extremely gravelly clay.

Permeability is moderate in the Bamtush Variant soil. Available water capacity is low or moderate. The effective rooting depth is more than 60 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used for timber production.

Douglas-fir, sugar pine, ponderosa pine, incense cedar, and California black oak are the main tree species on this unit. On the basis of a 100-year site curve (McArdle and Meyer, 1961), the mean site index is 100 for Douglas-fir on the Weitchpec Variant soil and 101 for Douglas-fir on the Bamtush Variant soil. The CACTOS 50-year site index for both soils is 68.

The main concerns affecting the production and harvesting of timber are the severe hazard of erosion, the slope, the low available water capacity, and the potential for mass movement. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected against erosion by constructing water bars. Using wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, can damage the roots of trees, and may reduce the growth or regeneration of seedlings planted later. Because of the potential for mass movement in areas of the Bamtush Variant soil, the careful location of roads and landings is necessary to avoid the need for deep cuts and fills. The slope limits the use of wheeled and tracked equipment in skidding operations. Cable yarding systems generally cause less disturbance of the soil than other methods. The droughtiness of the surface layer reduces the seedling survival rate, especially on south- and west-facing slopes. Trees that are suitable for planting include Douglas-fir and ponderosa pine. The characteristic understory plant community on this unit is mainly western brackenfern, serviceberry, poison-oak, and canyon live oak. The understory vegetation provides cover and forage for wildlife. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIIe, nonirrigated.

**213—Xeralfs-Xerorthents complex, 5 to 50 percent slopes.** This map unit is on hills and terraces. Much of the soil material has been removed by hydraulic mining. Areas are dissected by perennial streams. The vegetation is mainly conifers and brush in areas of Xeralfs and grass, brush, conifers, and hardwoods in areas of Xerorthents. Elevation is 1,500 to 2,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 130 to 180 days.

This unit is about 40 percent Xeralfs and 40 percent Xerorthents. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Weaverville clay loam, 9 to 30 percent slopes, and Musserhill gravelly loam, 9 to 30 percent slopes, on hills; areas of Atter extremely gravelly loamy sand, 9 to 15 percent slopes, on terraces and alluvial fans; and areas of Xerofluvents under woody streamside vegetation, such as alder and willow, on stream terraces. Also included are small areas of Rock outcrop, pits, and steep scarps and barren, eroding areas that have been disturbed by hydraulic mining. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Xeralfs consist of well drained soils of variable depths. These soils formed in alluvium from mixed rock sources and material weathered from weakly consolidated nonmarine sediments. Colors and textures are variable. A representative profile has a surface layer of strong brown very gravelly clay loam about 1 inch thick. The subsoil is red extremely gravelly clay loam about 22 inches thick. The substratum is reddish yellow extremely gravelly clay loam about 7 inches thick. Weakly consolidated sedimentary rock is at a depth of about 30 inches. The depth to weakly consolidated sedimentary material ranges from 10 to 60 inches.

Permeability is very slow to moderate in the Xeralfs. Available water capacity is very low to moderate. The effective rooting depth is 10 to 60 inches. Runoff is rapid, and the hazard of water erosion is moderate or severe.

The Xerorthents consist of well drained soils of variable depths. These soils formed in alluvium from mixed rock sources and material weathered from schist.

Colors and textures are variable. A representative profile has a surface layer of dark gray very gravelly clay loam about 4 inches thick. The underlying material is extremely gravelly loam about 8 inches thick. Platy metasedimentary rock is at a depth of about 12 inches. The depth to bedrock ranges from 5 to 40 inches.

Permeability is slow or moderate in the Xerorthents. Available water capacity is very low or low. The effective rooting depth is 5 to 40 inches. Runoff is very rapid, and the hazard of water erosion is moderate or severe.

This unit is used for homesite development or as watershed land.

If this unit is used for homesite development, the main limitations are the slope, the moderate or severe hazard of erosion, the depth to bedrock, and the very low to moderate available water capacity. Because of the variability of the soils in different areas of this unit, some areas may have very few limitations. The cuts that are needed to provide essentially level building sites can expose the bedrock. Preserving the existing plant cover during construction helps to control erosion. Soils disturbed during construction are subject to erosion during the rainy season. Temporary erosion-control measures may be necessary. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Erosion is a hazard in the steeper areas. Excavation for roads and buildings increases the hazard of erosion. Only the part of the site that is used for construction should be disturbed. Plans for homesite development should provide for the preservation of as many trees as possible. Management measures that improve or maintain the plant cover and promote the accumulation of litter on the surface reduce the hazard of erosion and increase the rate of water infiltration. The plant cover can be established and maintained by properly applying fertilizer, seeding, mulching, and shaping the slopes. Cutbanks are not stable and are subject to slumping. The slope is a concern affecting the installation of septic tank absorption fields. Absorption lines should be installed on the contour. The design of access roads should help to control surface runoff and stabilize cutslopes.

Careful management of watershed land, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. The present vegetation in most areas of Xeralfs is mainly manzanita, ponderosa pine, and ceanothus. The present vegetation in most areas of Xerorthents is mainly wild oats, starthistle, manzanita, digger pine, and scattered ponderosa pine. This vegetation provides cover and forage for wildlife and is a source of firewood. Streamside vegetation also provides important habitat for wildlife.

The land capability classification is VIIe, nonirrigated.

**215—Xererts, 2 to 15 percent slopes.** These deep or very deep, well drained soils are on hills. They formed in material weathered from weakly consolidated mudstone and siltstone. The native vegetation is mainly grasses and forbs. Elevation is 2,300 to 2,800 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

In a reference pedon of Xererts, about 35 percent of the surface is covered with cobbles, gravel, and stones. The surface layer is brown cobbly clay loam about 3 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray and light olive brown clay.

Included with these soils in mapping are small areas of Crefork loam, Haysum gravelly loam, and Jafa loam on terraces under conifers. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability is very slow in the Xererts. Available water capacity is moderate or high. The effective rooting depth ranges from 40 to more than 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for pasture.

If these soils are used as pasture, the main limitations are the rock fragments on the surface, cracks in the surface layer (fig. 5), and the moderate hazard of erosion. Open cracks form in the surface layer when these soils are dry. The establishment of pasture and the movement of livestock are hindered by the cracks and by the rock fragments on the surface. If this unit is grazed by livestock when the soils are too moist, trampling causes surface compaction and poor tilth and increases the hazard of erosion. Under optimum management and weather conditions, areas used as nonirrigated pasture can produce about 2 animal unit months per acre per year.

If these soils are used for homesite development, they are severely limited by the restricted permeability, a high shrink-swell potential, the moderate hazard of erosion, and low strength. If the soils are used as sites for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the restricted permeability. During the rainy season, however, the septic tank absorption fields may still fail to function properly. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential. Only the part of the site that is used for construction should be disturbed. The design of buildings and roads should

**Figure 5.—The use of Xererts, 2 to 15 percent slopes, as pasture is restricted by the cracks that form in the surface layer during dry periods.**

offset the limited ability of the soil to support a load. The possibility of settlement can be minimized by compacting the building site before construction is begun. The design of access roads should help to control surface runoff and stabilize cutslopes.

The land capability classification is IIIe-5, nonirrigated.

**216—Xererts-Haysum complex, 2 to 5 percent slopes.** This map unit is on alluvial fans and hills. The native vegetation is mainly grasses and forbs. Elevation is 2,200 to 2,500 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 130 days.

This unit is 45 percent Xererts on the lower hillslopes and 35 percent Haysum loam on alluvial fans. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included with these soils in mapping are small areas of very deep clay loam, Carrcreek gravelly loam, and Crefork clay loam on hills. Also included are small areas of moderately well drained soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Xererts are deep or very deep and are well drained. They formed in material weathered from weakly consolidated mudstone and siltstone. A reference pedon has a surface layer of brown clay loam about 3 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray and light olive brown clay.

Permeability is very slow in the Xererts. Available water capacity is moderate or high. The effective rooting depth ranges from 40 to more than 60 inches. Runoff is medium, and the hazard of water erosion is slight.

The Haysum soil is very deep and is well drained. It formed in alluvium from mixed rock sources. Typically, the surface layer is brown gravelly loam about 15 inches thick. The subsoil to a depth of 60 inches or more is yellowish brown gravelly clay loam.

Permeability is moderate in the Haysum soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as pasture or for homesite development.

If the Xererts are used as pasture, the main limitations are cracks in the surface layer, which form when the soils are dry. The establishment of pasture and the movement of livestock are hindered by these cracks. If these soils are grazed by livestock when the soils are too moist, trampling causes surface compaction and uproots the plants. Under optimum management and weather conditions, areas used as nonirrigated pasture can produce about 2 animal unit months per acre per year.

Few limitations affect the use of the Haysum soil as pasture. Under optimum management and weather conditions, irrigated areas can produce about 8 animal unit months per acre per year and nonirrigated areas can produce 3 animal unit months per acre per year.

If the Xererts are used for homesite development, the main limitations are the restricted permeability, a high shrink-swell potential, and low strength. Few limitations affect the use of the Haysum soil for homesite development. If areas of this unit are used as sites for septic tank absorption fields, using sandy backfill for the trench and installing longer absorption lines help to compensate for the restricted permeability. During the rainy season, however, the septic tank absorption fields may still fail to function properly. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential. Only the part of the site that is used for construction should be disturbed. The design of buildings and roads should offset the limited ability of the soil to support a load. The possibility of settlement can be minimized by compacting the building site before construction is begun.

The land capability classification is IIIe-5, irrigated and nonirrigated.

**217—Xerofluvents-Riverwash complex, 0 to 5 percent slopes.** This map unit is on flood plains and stream terraces. It formed in alluvium derived from mixed rock sources. The native vegetation is mainly riparian hardwoods and some conifers and brush in areas of the Xerofluvents. The areas of Riverwash are commonly barren. Elevation is 1,500 to 2,750 feet. The average annual precipitation is 30 to 45 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 180 days.

This unit is about 45 percent Xerofluvents and 35 percent Riverwash. The components occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are varying areas of the stream channel that are under water during some times of the year. Also included are small areas of Haysum gravelly loam, Carrcreek gravelly loam, and Atter extremely gravelly loamy sand on stream terraces under hardwoods, conifers, and brush; Brockgulch very gravelly loam, 50 to 75 percent slopes, on mountains under hardwoods and brush; Weaverville clay loam, 30 to 50 percent slopes, and Xeralfs on hills under conifers and brush; and areas of Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Xerofluvents consist of well drained soils that formed in alluvium from mixed rock sources. Colors and textures are variable. A reference pedon has a surface layer of variegated brown gravelly sand about 5 inches

thick. The underlying material to a depth of 60 inches or more is variegated brown extremely gravelly coarse sand or very gravelly fine sandy loam.

Permeability is moderate to rapid in the Xerofluvents. Available water capacity is very low or low. The effective rooting depth is more than 60 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate. These soils are subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

Riverwash consists of nearly barren, unstabilized, stratified sandy, silty, clayey, stony, cobbly, or gravelly alluvium derived from mixed rock sources. Areas of Riverwash are flooded, channeled, and reworked nearly every winter.

This unit is used as watershed areas, recreational areas, or wildlife habitat. A few areas are mined for sand and gravel.

Careful management of watershed land, recreational areas, and wildlife habitat is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. Areas of Xerofluvents and Riverwash provide seasonal habitat for fish and wildlife. The present vegetation in most areas is mainly willow and alder. The Xerofluvents also support some ponderosa pine, Douglas-fir, manzanita, ceanothus, and grasses.

The excessive removal of aggregates can lower the level of streambeds and widen stream channels and thus can undermine structures, lower the water table in areas adjacent to stream channels, erode streambanks, and increase sedimentation downstream. This sedimentation reduces spawning habitat for fish.

The land capability classification of the Xerofluvents is VIIw, nonirrigated, and that of the Riverwash is VIII.

**218—Xerorthents-Rock outcrop complex, 2 to 15 percent slopes.** This map unit is on mountains, hills, and terraces. Much of the soil material has been removed by hydraulic mining. The native vegetation is mainly grass, brush, conifers, and hardwoods. Elevation is 1,400 to 3,400 feet. The average annual precipitation is 30 to 50 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 180 days.

This unit is about 45 percent Xerorthents and 30 percent Rock outcrop. The components occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Xerorthents that have slopes of more than 15 percent; areas of Rubble land and piles of cobbles concentrated by hydraulic mining; steep scarps and barren areas that have been eroded as a result of hydraulic mining; areas of Weaverville clay loam, 30 to 50 percent slopes, on hills under conifers and brush; areas of Musserhill gravelly clay loam, 30 to 50 percent slopes, on hills under oaks and brush; and areas of Brockgulch very gravelly loam, 50 to 75 percent slopes, on mountains under oaks. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Xerorthents consist of well drained soils of variable depths. These soils formed in alluvium from mixed rock sources and material derived from schist. Colors and textures are variable. A representative profile has a surface layer of dark gray very gravelly clay loam about 4 inches thick. The underlying material is extremely gravelly loam about 8 inches thick. Platy metasedimentary rock is at a depth of about 12 inches. The depth to bedrock ranges from 5 to 40 inches.

Permeability is slow to moderate in the Xerorthents. Available water capacity is very low or low. The effective rooting depth is 5 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

Rock outcrop consists of barren, exposed ledges and knobs of hard bedrock. Except in isolated pockets of shallow soils, the Rock outcrop supports no vegetation.

This unit is used for homesite development or as watershed land.

If this unit is used for homesite development, the main limitations are the slope, the moderate hazard of erosion, the depth to bedrock, and the very low or low available water capacity. The cuts that are needed to provide essentially level building sites can expose the bedrock. Preserving the existing plant cover during construction helps to control erosion. Soils disturbed during construction are subject to erosion during the rainy season. Temporary erosion-control measures may be necessary. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Erosion is a hazard in the steeper areas. Excavation for roads and buildings increases the hazard of erosion. Only the part of the site that is used for construction should be disturbed. Plans for homesite development should provide for the preservation of as many trees as possible. Management measures that improve or maintain the plant cover and promote the accumulation of litter on the surface reduce the hazard of erosion and increase the rate of water infiltration. The plant cover can be established and maintained by properly applying fertilizer, seeding, mulching, and shaping the slopes. The removal of gravel and cobbles in disturbed areas is needed for landscaping, particularly in areas used for lawns. The slope is a concern affecting the installation of septic tank absorption fields. Absorption lines should be installed on the contour. Onsite investigation is needed to determine whether the permeability of the soil is adequate for the proper operation of septic tank

absorption fields. The design of access roads should help to control surface runoff and stabilize cutslopes.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. The present vegetation in most areas of the Xerorthents is mainly wild oats, starthistle, manzanita, digger pine, and scattered ponderosa pine. This vegetation provides cover and forage for wildlife.

Rock outcrop provides denning, nesting, and sunning areas for wildlife, including raptors, mammals, and reptiles.

The land capability classification of the Xerorthents is VIIs, nonirrigated, and that of the Rock outcrop is VIII.

In an area south of Junction City, this map unit is mapped adjacent to the soil survey of the Shasta-Trinity National Forest Area. The delineations of this unit do not match those on the maps of the adjacent soil survey.

**219—Xerorthents-Rock outcrop complex, 15 to 75 percent slopes.** This map unit is on mountains, hills, and terraces. Much of the soil material has been removed by hydraulic mining. The native vegetation is mainly grass, brush, conifers, and hardwoods. Elevation is 1,400 to 3,400 feet. The average annual precipitation is 30 to 50 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 90 to 180 days.

This unit is about 45 percent Xerorthents and 30 percent Rock outcrop. The components occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Xerorthents that have slopes of less than 15 percent; areas of Rubble land and piles of cobbles concentrated by hydraulic mining; steep scarps and barren areas that have been eroded as a result of hydraulic mining; areas of Weaverville clay loam, 30 to 50 percent slopes, on hills under conifers and brush; areas of Musserhill gravelly loam, 30 to 50 percent slopes, on hills under oaks and brush; and areas of Brockgulch very gravelly loam, 50 to 75 percent slopes, on mountains under oaks. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Xerorthents consist of well drained soils of variable depths. These soils formed in alluvium from mixed rock sources and material weathered from schist. Colors and textures are variable. A representative profile has a surface layer of dark gray very gravelly clay loam about 4 inches thick. The underlying material is extremely gravelly loam about 8 inches thick. Platy metasedimentary rock is at a depth of about 12 inches. The depth to bedrock ranges from 5 to 40 inches.

Permeability is slow to moderate in the Xerorthents. Available water capacity is very low or low. The effective rooting depth is 5 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe or very severe.

Rock outcrop consists of barren, exposed ledges and knobs of hard bedrock. Except in isolated pockets of shallow soils, the Rock outcrop supports no vegetation.

This unit is used as watershed areas, recreational areas, or wildlife habitat.

Careful management of watershed areas is needed to keep surface erosion to a minimum and to maintain the quality of the runoff. The present vegetation in most areas of the Xerorthents is mainly wild oats, starthistle, manzanita, digger pine, and scattered ponderosa pine. This vegetation provides cover and forage for wildlife.

Rock outcrop provides denning, nesting, and sunning areas for wildlife, including raptors, mammals, and reptiles.

The land capability classification of the Xerorthents is VIIe, nonirrigated, and that of the Rock outcrop is VIII.

# Prime Farmland

In this section, prime farmland is defined and the soils in the survey area that are considered prime farmland are listed.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. An adequate moisture supply and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They either are used for food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils commonly receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and length of growing season are favorable, and the level of acidity or alkalinity is acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

Soils that have a high water table, are subject to flooding, or are droughty qualify as prime farmland soils where these limitations are overcome by drainage systems, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information about the criteria for prime farmland can be obtained at the local office of the Natural Resources Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 5,854 acres, or nearly 3 percent of the survey area, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available.

The map units in the survey area that meet the requirements for prime farmland are listed in table 4. This list does not constitute a recommendation for a particular land use. See appendix A for the specific criteria used to determine prime farmland. The extent of each listed map unit is shown in table 3. The location of each map unit is shown on the detailed soil maps that accompany this publication. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units."

# Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected soils data are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as watershed land; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

## Crops and Pasture

Prepared by Luana Kiger, district conservationist, and Nick Pappas, area agronomist, Natural Resources Conservation Service.

The survey area has a long history of agricultural productivity. Hayfork, which was once called Hay Town because so much hay was cut on the meadows that surrounded the village, was settled as an agricultural area in the 1850's and 1860's. The farms at that time were producing sufficient quantities of grain, potatoes, beans, butter, eggs, and livestock to furnish the rest of the population of Trinity County. Farms at Steiner's Flat sold apples, pears, cherries, and vegetables to miners during this period.

Today, extensive agriculture is limited in the survey area because of the small size of individual parcels, a lack of water, and microclimate variability. The Hayfork area produces alfalfa, grass-legume hay, grass hay, and pasture. Agriculture in the Lewiston area is predominantly pasture and some hayland and truck crops. Onsite investigation is needed to evaluate soil and microclimate suitability for particular crops.

Home orchards and gardens are very popular in the survey area, but they require extensive input for high productivity. The clayey soils around Weaverville and Hayfork benefit from additions of organic material. Some soils along streams are influenced by alluvium from serpentinitic rock and have a calcium-magnesium imbalance. This imbalance can be partially corrected by the addition of gypsum. Most gardens are planted in late spring or early summer because of the risk of late killing frosts, and most are irrigated. Fall gardens are not reliably successful. Varieties suited to a short growing season should be selected. Plants requiring a long growing season should be started indoors or purchased for transplanting after the date of the last killing frost.

The following paragraphs discuss major soil limitations and some recommended management practices for the soils of the survey area that are suitable for irrigated and nonirrigated hayland and pasture. Management concerns include controlling erosion, preserving soil tilth, and effectively using irrigation water. Good farmland management practices ensure sustained productivity, help to achieve better profits, and assist in pest management.

Some recommended farming practices are conservation tillage, erosion control, irrigation water management, shaping and grading, pasture management, and hayland management. The use of

these or other applicable practices depends upon land use objectives, soil characteristics, crop selection, and economic considerations.

### Conservation Tillage

Using a system of conservation tillage when hayland or pastureland is established reduces the number of tillage operations necessary to control weeds. Conservation tillage incorporates crop residue into the soil, breaks up the soil for favorable air and water movement, and ensures an adequate seedbed. Such a system can range from a no-till operation to something less than conventional tillage. Crop residue management is a very important component.

Conservation tillage, in contrast to conventional tillage, provides soil protection but requires more intensive management. Conservation tillage can also have financial benefits by decreasing production costs. Soils on slopes that need protection from water erosion benefit from conservation tillage.

Conservation tillage can affect pest management and fertilizer programs. Individual farming needs should be considered.

### Erosion Control

Erosion-control measures should be considered on all soils. Soils that have slopes of more than about 2 percent are most susceptible to water erosion. Unique erosion problems occur in the survey area. The cold climatic conditions limit vegetative cover during critical periods. Water erosion occurs when the soils have inadequate vegetative cover and rain strikes the bare soil or water runs across the surface.

Because of the location of pasture and hayland in the survey area, run-on and overland flows from adjacent steeper areas can cause flooding and erosion. Diversions and management of surface water help to protect the soil from erosion. Because most areas of hayland and pasture are adjacent to stream corridors, streambank erosion can be reduced and water quality protected by fencing stream corridors so that livestock are excluded.

### Irrigation Water Management

Irrigation water management is essential for all irrigated soils. Poorly designed field grades and water delivery systems are important for profitable hayland or pasture production and the conservation of the soil and water resources. Irrigation methods that are suitable for use in the survey area are contour flooding, border, and sprinkler systems.

In a surface irrigation system, such as the border method, the fields should be set at the grade that minimizes irrigation water runoff, allows adequate infiltration to meet plant water needs, and preserves water quality. Soil characteristics should be evaluated before fields are leveled, shaped, or graded. The depth of the soil over restrictive layers should be determined so that an adequate potential rooting depth is ensured. The length of runs should be designed according to soil infiltration characteristics so that adequate water infiltration is achieved. Sprinkler irrigation systems are best suited to soils that have a very high infiltration rate or that have slopes of more than 2 percent. Information provided in the section "Detailed Soil Map Units" and in table 14 can be useful when decisions about irrigation management are made.

Good management of irrigation water is achieved by controlling the rate, amount, and timing of applications for maximum production without soil and water degradation. Such management is profitable, conserves water, and protects water quality.

### Pasture Management

Pasture management includes considerations that protect the soil and also sustain profitable yields of forage. Maintenance of desirable plants is a major consideration. Desirable plants are generally the most palatable. Weedy or undesirable plants may thrive because they are not grazed by livestock unless the more palatable species are not available. Maintaining a pasture of desirable plants involves allowing grazing at levels that provide for continued vigorous growth. Enough leaf surface must be available for the plants to get enough sunlight to manufacture more plant materials. When the plants are harvested or grazed to the crowns, their rate of growth is greatly reduced. Thus, undesirable plants that have not been grazed are more likely to thrive. Clipping or mowing can control weeds and modify species composition. With good management that includes good species composition and proper fertilization and irrigation, annual yields of 8 to 10 animal unit months per acre can be expected. On dryland pasture, the yields range from 0.5 to 5.0 animal unit months per acre. More specific information regarding yields is provided in the section "Detailed Soil Map Units."

### Hayland Management

Hayland management should achieve sustained production and protect the soil. Sustained production can be attained by keeping the field clean of weed infestations and harvesting the forage at intervals that allow the plants to sustain optimum growth. Proper management of irrigation water is essential. For hayland that includes stands of alfalfa, overirrigation can deplete the level of oxygen in the soil. Many varieties of alfalfa cannot tolerate even short periods of water saturation

during active growth. If the hayland is overirrigated, plant roots die or the plants are attacked by disease and lose vigor.

### Yields per Acre

The average annual yields per acre that can be expected of the principal hay or pasture crops under a high level of management are given in the section "Detailed Soil Map Units." In any given year, yields may be higher or lower than those indicated in the map unit descriptions because of variations in rainfall and other climatic factors.

The management needed to obtain the indicated yields of hay and pasture includes drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and other nutrients for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated hayland or pasture, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for hayland or pasture. Yields may increase as new plant varieties or production technologies are developed. The productivity of a given soil relative to that of other soils, however, is not likely to change.

Crops other than those listed in the map unit descriptions are grown in the survey area, but estimated yields are not given because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for these and other crops.

### Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA, 1961). These levels are defined in the following paragraphs.

*Capability classes*, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

*Capability subclasses* are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry or characterized by a short growing season.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

*Capability units* are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an

Arabic numeral to the subclass symbol, for example, IIIe-3 and IVe-9. The numbers used to designate units within the subclasses are as follows:

0. Indicates limitations caused by stony, cobbly, or gravelly material in the substratum.
1. Indicates limitations caused by slope or by an actual or potential erosion hazard.
2. Indicates a limitation of wetness caused by poor drainage or flooding.
3. Indicates a limitation of slow or very slow permeability in the subsoil or substratum.
4. Indicates a low available water capacity in sandy or gravelly soils.
5. Indicates limitations caused by a fine textured or very fine textured surface layer.
6. Indicates limitations caused by salts or sodium.
7. Indicates limitations caused by rocks, stones, or cobblestones.
8. Indicates that the soil has a very low or low available water capacity because the root zone generally is less than 40 inches deep over massive bedrock.
9. Indicates limitations caused by very low or low fertility or by acidity or toxicity that cannot be corrected by adding normal amounts of fertilizer, lime, or other amendments.
10. Indicates that a problem or limitation, such as subsidence or susceptibility to burning or soil blowing, is caused by a high content of organic matter.

The irrigated and nonirrigated capability classification of each map unit is shown in table 5 and in the section "Detailed Soil Map Units." If a soil is not irrigable, only the nonirrigated capability classification is shown.

## Watershed Land Management

Prepared by Jim Yates, soil conservationist, and Richard King, area range conservationist, Natural Resources Conservation Service.

The survey area contains many acres of soils that support brush, grass, and only scattered trees as a potential native plant community. These areas serve as watershed or are used as recreational areas or wildlife habitat. Although all of the soils in the survey area serve as watershed land, the soils discussed in this section, because of inherent soil or site characteristics, are not typically managed for other types of land use. Most of these areas have very steep slopes, and accessibility is poor. Soils in these areas are generally shallow and have a low or very low available water capacity. Some soils are deeper and have a higher available water capacity but have high soil temperatures because they occur on steep, south-facing slopes. These soils have the potential to produce various species of brush and grasses and scattered hardwoods and conifers. In some areas the stands of brush are dense. On other soils the plant community is made up of open grass areas with scattered brush and trees. Potential plant communities are described in the section "Detailed Soil Map Units" (Barbour and Major, 1977; Burcham, 1957; Crampton, 1974; Dayton, 1937; DeGarmo, 1980; Hitchcock, 1951; Jepson, 1960; McMinn, 1974; Miller and Lamb, 1985; Munz and Keck, 1975; Randall and others, 1981).

This section provides information regarding general management considerations that affect areas used as watershed land. Careful consideration should be given to the effects of all management practices and their impact on the important watershed function of the soils (Brown, 1974).

### Management

Wildfire is a common natural occurrence in watershed areas. Its frequency, however, has decreased because of fire-control programs. Fire suppression in brushfields for long periods of time results in areas of tall mature brush and an abundance of old, standing dead plant material. When these areas do burn, an unusually hot fire can result. A very hot fire is difficult to control and may have a detrimental effect on the physical and chemical properties of the surface. Generally, all vegetation and litter are consumed and the surface is left unprotected from the erosive forces of water. Severe erosion can result in a long-term loss of onsite productivity. Sedimentation can damage offsite water quality and fish habitat, smother the eggs of fish, and destroy other aquatic organisms. An accelerated frequency of fire over extensive areas can have devastating effects if a stabilizing cover vegetation cannot be maintained (Munns, 1920; Vogl, 1982; Welling and others, 1984).

Through the implementation of a prescribed burning plan, a mosaic of uneven-aged brush stands can be created, which also provides diverse types of wildlife habitat. Avoiding the burning of canyon bottoms and riparian areas helps to prevent the loss of valuable habitat for fish and wildlife. Establishing wildlife watering facilities helps to maintain summer water sources for birds and small mammals in all of the plant communities (Davis, 1959; Green, 1977, 1981, and 1982a; Grenfell and others, 1980; Lewis, 1974; Martin and Dell, 1978; Martin and others, 1979; Noste, 1985).

Most of these plant communities have very low potential for use in typical commercial livestock operations. Type conversion to grass is not recommended on the brushfields because of their inaccessibility, the slope, the hazard of erosion, and the low or very low available water capacity of most of the soils. Goats are potentially well adapted and could be

used to maintain firebreaks and open areas (Green, 1982b).

Site potential for timber and firewood products is very low on these soils. Scattered trees that produce only low quality timber are in some of these plant communities but cannot be easily managed or harvested. Some areas have some potential for fuelwood products, but oaks are generally scattered over very steep and inaccessible terrain. The value of these oaks as thermal cover for deer during the winter months and their potential for wild turkey habitat should be considered at the lower elevations. The need for access roads should be carefully evaluated, and the design of these roads should avoid damaging the watershed (Burroughs and others, 1976; Satterlund, 1972).

Management of these brush and noncommercial woodland areas should be aimed at increasing the available wildlife habitat, improving access for recreational uses, and maintaining the stability of the watershed. Such management may include a combination of prescribed burning, careful development of access roads, and establishment of water sources for wildlife. If recreational access is increased, erosion-control measures may be needed in areas where access roads are established and in any other areas where the soil is disturbed. Commercial livestock or timber management may not be feasible on an extensive scale in these plant communities.

Information about the management of individual soils is provided under the heading "Detailed Soil Map Units." The local offices of the Natural Resources Conservation Service, the California Department of Forestry, and the Cooperative Extension Service can provide additional information and assistance.

## Woodland Management and Productivity

Prepared by Jack Bramhall, area forester, Natural Resources Conservation Service.

Woodland benefits the survey area in numerous ways. The beauty of the wooded areas in Trinity County influences the potential for recreation. Forest land provides essential habitat for fish and wildlife, which are vital to the recreation industry. The forested watersheds provide clean water for wildlife and for agricultural, urban, and recreational uses. Many residents of Trinity County enjoy the privacy and solitude that the wooded areas provide for homesites. The forest products industry is a primary employer for residents of the county. Products from the county's forests consist of softwood logs and lumber, wood chips, and firewood. These products are major export commodities from the county (California Department of Forestry, 1980).

Forests have contributed to the economy of Trinity County since around 1850. The gold rush of 1848-50 brought settlers into Trinity County, and lumbering activities began at about the same time (Jones, 1981). The original products were flume lumber for the mining industry, construction material for buildings, and firewood. The first sawmills were whip sawmills established near Weaverville in 1851. The first steam-operated sawmill was established near Weaverville in 1880. It was not until after World War II that the lumber industry took on major proportions in the county.

### Forest Soil Interpretations

The general information provided in this section, along with information presented in the section "Detailed Soil Map Units," is intended only for use as a guide. The information may be useful to professional resource managers, landowners, planners, and visitors to the area for understanding the characteristics and management of forest soils in Trinity County. Onsite investigation by resource professionals is needed for site-specific data and for solutions to specific resource problems.

Tables 6 and 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those map units in which the soils are suitable for wood crops are listed. The following paragraphs describe the information provided in these tables.

The first column in table 6 lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The ordination system is a uniform system of labeling individual soils or groups of soils to determine the potential productivity and the main soil properties that influence their use and management as woodland. The ordination system has two levels—class and subclass. The ordination symbol is a combination of the class and subclass symbols.

The class symbol is a number that denotes potential productivity in cubic meters of wood per hectare per year for an indicator tree species (1 cubic meter per hectare equals 14.3 cubic feet per acre). Potential productivity is based on a site index. The growth in cubic meters is calculated at the age of culmination of mean annual increment for fully stocked natural stands (unmanaged except for protection) as given in standard normal yield tables. The ordination class is listed for the first commonly grown tree species identified for each soil in table 6. This species is common in the area and is generally the most productive on that soil. Potential volume growth values are based on yield tables by McArdle and Meyer (1961) for Douglas-fir, by Meyer

(1938) for ponderosa pine, and by Schumacher (1926) for white fir. Yield is the total wood produced in the boles of the tree to the smallest top diameter given in the table.

The subclass symbol is a capital letter that denotes certain soil or physiographic characteristics contributing to important hazards or limitations that affect management. The subclasses in the survey area are described in the following paragraphs.

Subclass A.—Soils that have no limitations or only slight limitations affecting forest land use or management.

Subclass C.—Soils that have limitations affecting forest land use or management because of the kind or amount of clay in the upper part of the profile.

Subclass D.—Soils that have limitations affecting forest land use or management because of a restricted rooting depth. Examples are shallow soils underlain by bedrock, a hardpan, or other layers that restrict roots.

Subclass F.—Soils that have limitations affecting forest land use or management because of a high content of rock fragments in the profile. Rock fragments are larger than 2 millimeters and less than 10 inches in diameter.

Subclass R.—Soils that have limitations affecting forest land use or management because of the slope.

Subclass S.—Soils that have limitations affecting forest land use or management because they have sandy textures and have only a thin B horizon or no B horizon. The use of equipment is restricted on these soils. Also, the soils have a low available water capacity and generally are low in available plant nutrients.

Subclass T.—Soils that have limitations affecting forest land use or management because of excessive alkalinity, acidity, sodium salts, or other toxic substances within the root zone that limit or impede the development of desirable tree species.

If the limitations are moderate or severe, the subclasses are designated according to the definitions listed above. For example, an ordination symbol of 7R means that potential productivity is 7 cubic meters per hectare per year and that the slope is a moderate or severe limitation. If a soil has more than one limitation, the priority is as follows: R, T, D, C, S, F, and A. If limitations are only slight, the subclass letter "A" is used. Thus, an ordination symbol of 8A means that potential productivity is 8 cubic meters per hectare per year and that soil-related limitations, if any, are slight. Plant competition and other special considerations are not used to determine subclass.

The potential productivity of merchantable or commonly grown trees on a soil is expressed as a site index. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The site index and the range in site index are listed in table 6 for each soil for which adequate data are available. The site indexes for ponderosa pine are based on the 100-year base age curves from Meyer (1938). Site indexes for Douglas-fir are based on the 100-year base age curves by McArdle and Meyer (1961). Site indexes for white fir and California red fir are based on the 50-year base age curves from Schumacher (1926).

Included in the map unit descriptions are site indexes based on the 50-year CACTOS site curve (Wensel and Beging, 1985).

Table 7 can be used to evaluate management concerns that affect planting, managing, and harvesting forestry products. "Slight," "moderate," and "severe" indicate the degree of the major soil limitations to be considered in management.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition, which may be a significant factor, is not considered in this rating. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of slight indicates that no problem is expected under normal conditions; moderate indicates that extra precautions are advisable; and severe indicates that precautions are important and replanting may be necessary. Trees to plant are those that are suited to the soils and to commercial wood production. Adapted species are listed in the detailed soil map unit descriptions. Natural reseeding by conifers is sometimes adequate. Where mineral soil is exposed during years of favorable seed production, good regeneration can be expected on all but very gravelly, shallow, or serpentinitic soils. Most of the hardwood species resprout after cutting. Resprouting is most vigorous when cutting is done during the period from December through May.

Soil properties that commonly influence seedling mortality include texture, content of rock fragments, temperature, and drainage. Soils that have an available water capacity of less than 2.5 inches in the upper 24 inches have severe limitations for seedlings, especially on south- and west-facing slopes below an elevation of 5,000 feet. A low available water capacity is less critical at the higher elevations where the potential plant water use is generally less intense.

Soils at low elevations that have relatively warm mean annual temperatures can present major problems

affecting the survival of seedlings. Soil temperature at a depth of about 20 inches commonly is several degrees higher in the open than under a tree canopy. Surface temperatures may also be high enough during the summer to cause heat injury to Douglas-fir seedlings on south-facing slopes. Species selection, type and size of planting stock, availability of shade, type of harvest, and the available water capacity of the soil should be considered when these areas are reforested.

Ratings of plant competition indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; and *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants. The species of competing plants and severity of competition vary, depending on soil type and past treatment of the site.

Plant competition is related to the available water capacity of the soils. Productive soils have a high available water capacity, and many plant species grow well. As a result, plant competition may be severe. Perennial and annual grasses, forbs, various manzanitas, deerbrush, shrub live oak, and shrub tanoak can dominate a site for several years after timber is harvested. Conifer seedlings commonly are slow to regenerate, and they can be suppressed by other vegetation because of the competition for moisture and light. Careful selection of silvicultural and harvesting systems, intensive site preparation, and followup treatments may be needed to ensure adequate reforestation. The less productive soils have a lower available water capacity, and thus plant competition is less intense, except where unwanted plants have had enough time to establish extensive root systems. The rate of tree growth on these soils is generally slower, however, and the seedling mortality rate may be high because of high temperatures and a lack of soil moisture.

Limitations affecting the revegetation of exposed areas are given in table 7. Subsoil horizons are commonly exposed during forest management activities. They may be exposed on landings, road cuts and fills, and on some skid roads. Revegetation may be desirable or even required in these areas. The purpose of revegetation may be for erosion control or for timber production. Separate ratings are given for revegetation with grasses and with trees. Characteristics of the subsoil that influence planting conditions, germination, and subsequent growth rate are considered in the ratings. The ratings are general. Onsite investigation is needed for evaluation of individual projects.

A rating of *slight* indicates that few problems affect revegetation. If locally adapted grasses are properly seeded, the establishment of a good stand can be expected. If trees are planted, good survival and growth can be expected, unless compaction or other local unfavorable conditions prevail. Natural revegetation is more successful than for soils that have a moderate or severe rating. A rating of *moderate* indicates that additional care is needed in choosing methods or types of plants for erosion control. If trees are planted, some mortality and growth rates lower than those in undisturbed areas can be expected. A rating of *severe* indicates that intensive measures are needed for the establishment of a stand of plants that can adequately control erosion. Some soils that have a rating of severe have little need for erosion-control plantings because most of the area is hard, exposed rock that has only a small amount of erodible soil. Onsite evaluation is essential if revegetation is considered in areas where the soil has a rating of severe.

Ratings of equipment limitations reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that the use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Soil wetness has an influence on the type of equipment and time of use. Soils are usually too wet for ground yarding systems between November 15 and April 1. Surface compaction caused by wheeled or tracked equipment can be a problem on all soils when they are wet, except for coarse or very gravelly soils. Roads frequently are impassable during the rainy season, except in areas where they have been rocked or where the soils are very gravelly or sandy. Depth of snowpack limits access and equipment use at elevations above 4,500 feet from November 15 through April 15. Some soils are extremely dusty when dry. Watering, oiling, or other road surface and dust-control treatments may be desirable on these soils during periods of heavy use.

The slope is an important consideration when harvesting equipment or systems are selected. Slope gradients of less than 30 percent present few limitations to wheeled and tracked equipment. In areas that have slopes of 30 to 50 percent, however, more care is

needed in choosing equipment and laying out the site. Cable yarding systems generally cause the least soil disturbance where the terrain and road systems are conducive to their use, but where existing skid and haul roads can be used or where short, steep slopes are intermixed with flat areas, tractor yarding equipment can sometimes be used with minimal soil disturbance. Low ground-pressure, torsion-suspension equipment can be used on the steeper slopes and causes less soil disturbance and compaction than conventional tractor equipment (Albright, 1980). In large areas that have slopes of more than 50 percent, cable yarding causes less disturbance of the soil than tractor yarding.

Ratings of the hazard of soil damage from fire are intended to be used as a general guideline for the planning of either prescribed burns or revegetation after wildfire. Soil damage can result from burning. The risk of damage increases with the intensity of heat. The damage is mainly related to the loss of organic matter. Some soils have characteristics that enable them to withstand this loss better than other soils. These characteristics are used to rate these soils for the hazard of damage from burning. A rating of *slight* indicates that most types of fire will not have an adverse effect on soil characteristics and future productivity; *moderate* indicates that some extra care is needed in planning so that favorable soil characteristics are maintained; and *severe* indicates that special precautions are needed to protect the content of organic matter and thus maintain productivity.

Ratings of the hazard of soil damage from compaction indicate the tendency of a soil to be adversely affected by the weight of equipment or other traffic. Soil density is increased after compaction, thus increasing the resistance to root penetration and reducing the availability of oxygen to plant roots. Compaction may also reduce permeability and the rate of water infiltration. Ratings are based on texture, the content of organic matter, and the content of rock fragments in the upper 10 inches of the soil. A rating of *slight* indicates that considerable effort would be required to compact the soil enough to adversely affect plant growth or the rate of water infiltration; *moderate* indicates that less effort is required to cause compaction or that an easily compacted soil recovers rapidly because of the type and amount of clay; and *severe* indicates that the soil can be easily compacted enough to cause adverse effects and that it does not readily recover. Compaction is most likely to occur when the soil is moist. Forest management activities that can cause compaction are site preparation, log skidding, livestock grazing, and any other activity that applies weight on a moist soil (Adams and Froehlich, 1981; Albright, 1980).

Ratings of the hazard of sheet and rill erosion when logs are yarded by tractor or cable systems are also given in table 7. The ratings do not account for gully, ditch, or streambank erosion or for mass movement caused by geologic conditions, unusual local moisture conditions, ground disturbance, or vegetative manipulation. Soils that have an obvious tendency to slump or gully or that are known to be susceptible to mass movement are identified in the map unit descriptions. In some cases, existing slips are shown on the soil maps. The use of slope stability maps and onsite investigation of these hazards are strongly recommended.

The rating of the hazard of sheet and rill erosion under common post-harvest conditions is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil. The ratings are based on approximately 180 transects that were made in recently harvested areas in northern California. Remaining overstory and understory vegetation, logging slash, root systems, and waterbars reduce the erosion hazard below that for bare soil. The hazard of sheet and rill erosion following timber harvesting is generally slight or moderate for the harvested area as a whole where cable yarding is used. Tractor yarding generally results in a higher hazard of erosion on steep slopes. The results of the study of these transects are generally in agreement with most research literature on the subject (Berry, 1983).

A rating for erosion hazard under bare soil conditions is given in the detailed soil map unit descriptions. The rating is valid only for a soil that is not covered by vegetation, mulch, or other ground cover. This condition is very uncommon on forest land. An extremely hot fire, tillage for agriculture, home construction, or attempted conversions to other land uses could result in bare soil conditions. The rating provides a general guide regarding the erodibility of exposed surface soil on skid roads and landings. This rating is based on the slope and on the inherent erodibility of the soil.

**Management Considerations**

Erosion rates on skid roads within harvested areas are frequently high. Because of the possibility of reduced growth caused by compaction and the removal of surface soil horizons on deeply disturbed skid roads, total productivity can be reduced substantially if skid road density is high. When used together, the ratings in table 7 can help the user decide whether or not a significant reduction in growth rate is likely.

Conservation practices that can be used to prevent excessive soil loss and degradation of water quality vary by site. The proper location, design, and installation of roads, culverts, waterbars, and stream crossings are critical. Seeding or mulching in highly erodible areas reduces the hazard of sheet and rill erosion. Buffer strips along streams help to prevent sediments from entering the water, help to control streambank erosion, and maintain the favorable water temperature that is vital to game fish. Filter strips constructed with woody slash along the base of fill slopes helps to keep sediments from reaching streams.

Erosion-control measures and soil characteristics should be considered when site preparation for tree planting is planned. Machinery and fire can have an adverse effect on soil and erosion rates. Selection of the proper equipment and a careful and skilled operator are important factors in controlling erosion related to forest management activities.

### Special Considerations

A few forest soils in the survey area have chemical imbalances that hinder tree growth. Soils from serpentinitic parent material are known to have calcium/magnesium ratios detrimental to the growth of Douglas-fir and ponderosa pine. Dubakella and Weitchpec soils are examples. On these soils, incense cedar, digger pine, Jeffrey pine, and various shrub species typically dominate. These soils are in bands on ridgetops on Hayfork Summit and on the southeast side of Oregon Mountain and in other small areas.

If brush clearing or site preparation by tractor windrowing is considered as a reforestation technique, care should be taken to avoid removal of the upper part of the surface layer because nutrients are concentrated in this part of the soil. Removal of the surface layer may increase the seedling mortality rate and reduce productivity. Constructing windrows on the contour helps to prevent erosion resulting from the concentration of surface runoff. Ensuring that the windrow piles extend entirely across the cleared slope helps to catch the surface runoff, or the ends of windrow piles should overlap the ends of piles downslope. Also, the hazard of erosion can be reduced by decreasing the downslope distance between windrow piles.

## Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties generally are favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures. The specific criteria used to determine soil limitations are given in appendix B.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for dwellings without basements and for local roads and streets in table 9 and interpretations for septic tank absorption fields in table 10.

*Camp areas* require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils are gently sloping and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

*Picnic areas* are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

*Playgrounds* require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

*Paths and trails* for hiking and horseback riding

should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

*Golf fairways* are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

## Wildlife Habitat

Prepared by D.W. Patterson, area biologist, Natural Resources Conservation Service.

Wildlife and fish provide opportunities for recreation and income and add to the enjoyment and quality of life in Trinity County. The main type of wildlife habitat in the county is woodland, which supports a mixture of both conifer and broadleaf trees. These woodlands predominantly contain uneven-aged stands well interspersed with areas of open grassland, brush, and oak/grass woodland. These well interspersed vegetative types create diversity capable of supporting a considerable number and variety of wildlife. Small areas of cropland on valley bottoms and terraces provide additional habitat diversity. The Trinity River and its large number of major and minor tributaries provide considerable habitat for salmon, steelhead trout and resident trout, sturgeon, and nongame fish. Streamside vegetation along these same waterways provides important habitat for both fish and wildlife.

Important game species include Colombian black-tailed deer and California mule deer, black bear, mountain lion, blue grouse, band-tailed pigeon, ruffed grouse, mountain quail, and California valley quail. Important nongame species include foxes, coyote, mink, raccoon, ring-tailed cat, skunk, squirrels, and porcupine and a diversity of other birds, reptiles, and amphibians. The kinds and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. Soil characteristics alone rarely dictate the presence or absence of particular wildlife species. Along with other factors, however, such as climate, soils directly affect the amount and distribution of vegetation that is available to wildlife as food and cover and often the availability of water as well. Wildlife habitat can be created or improved in most areas. Because wildlife is a product of the land, soils information should be considered along with other resources when land use is planned that affects wildlife.

### Habitat-Soil Groups

The soils of the survey area have been assigned to habitat-soil groups. Each group consists of soils that have some similar characteristics and that produce or have the potential to produce the same general type of habitat or occur on adjacent landforms. The vegetative component of wildlife habitat, as indicated by existing or potential vegetative cover, is strongly influenced by soil characteristics. The following descriptions of these habitat-soil groups include common soil characteristics, representative vegetation, and types of wildlife habitat provided.

*Habitat-Soil Group I—Valley Floor and Uplands.* The major soils in this group are Carrcreek, Crefork, Haysum, Jafa, and Musserhill soils and Haploxerolls and Xererts. These soils are on stream terraces, alluvial fans, and hills. Atter soils and Xerorthents are in areas that have been hydraulically mined. Xerofluvents are adjacent to streams. The soils in this group are dominantly moderately deep to very deep. They are nearly level to steep and are well drained.

Habitat types range from open hayland and pastureland to mixtures of Oregon white oak, digger pine, ponderosa pine, and Douglas-fir, buckbrush, and manzanita and an interspersed understory of grass and herbaceous plants. Hardwood riparian vegetation grows along streams. Mixtures of open hayland and grassland along with adjacent brush and trees provide vegetative diversity of importance to many wildlife species. This group provides important habitat for deer and other wildlife, especially when snow accumulates at the upper elevations.

*Habitat-Soil Group II—Upland Brushfields.* The major soils in this group are Brockgulch Variant, Choop, Etsel, Holkat Variant, Skyrock, Springgulch, and Vitzthum soils. These soils are on hills and mountains. They are shallow to very deep, are steep to extremely steep, and are excessively drained to well drained.

Vegetation is predominantly manzanita, buckbrush, chamise, and deerbrush. Scattered oaks and other trees also occur, especially on sheltered slopes and along adjacent waterways. Other trees, including digger pine and knobcone pine, also grow as scattered individuals or in small groves throughout the brushfields.

Brushfields can provide valuable food and cover for wildlife, especially deer. They provide habitat diversity in areas where they are adjacent to woodland and streamside vegetation. The more mature portions of brushfields provide valuable fawning cover for deer. In many cases, converting brushfields to permanent grasslands is not feasible.

*Habitat-Soil Group III—Live Oak/Digger Pine Woodland (South Slopes).* The major soils in this group are Brockgulch, Cargent, and Vanvor soils. These soils are on steep to extremely steep south-facing slopes. They are moderately deep and are well drained. Vegetation is primarily canyon live oak and digger pine and an understory of brush and scattered areas of open grass. Understory brush occurs as scattered clumps and in strips.

Other soils in this group that are on south-facing slopes or on other slopes are Azule, Millsholm, and Musserhill Variant soils. These soils have a canopy of blue oak and an understory of grass and brush. Sheetiron Variant soils are also in this group. They support white oak and grass and brush. They are moderately sloping to very steep. This group also includes areas of rock outcrop.

Areas of this group are dissected by both perennial and intermittent waterways and associated streamside vegetation. In the steeper areas, access for foot or vehicular traffic is difficult.

This group provides important cover and forage for a wide variety of wildlife. South-facing slopes provide important food and thermal radiation during winter and early spring, especially for deer.

*Habitat-Soil Group IV—Douglas-Fir/Pine/Oak Woodland.* The major soils in this group include Bamtush, Bamtush Variant, Barpeak, Beargulch, Brownbear, Brownscreek, Caris, Demogul, Dougcity, Dubakella, Holkat, Hoosimbim, Hotaw, Indleton, Marpa, Marpa Variant, Minersville, Minersville Variant, Pardaloe, Sheetiron, Tallowbox, Valcreek, Weaverville, Weitchpec, and Weitchpec Variant soils and Xeralfs. These soils are primarily on mountains. They are moderately steep to very steep in most areas, but some areas are extremely steep. The soils are moderately deep to very deep and are dominantly well drained.

Vegetation is primarily Douglas-fir, ponderosa pine, California black oak, Oregon white oak, and white fir mixed with canyon live oak and Pacific madrone. The soils that formed in serpentinitic rock, such as Dubakella and Weitchpec soils, support open stands of Jeffrey pine, incense cedar, and digger pine. Skyrock Variant soils also are in this group. They support red fir and western white pine. An extensive understory of brush and grass may occur, especially in areas where timber has recently been harvested.

The landscape is extensively dissected by deep canyons and waterways, which support considerable streamside vegetation.

This group provides extensive areas of woodland habitat, which is fairly diversified by rock outcroppings, waterways, and uneven-aged trees resulting from timber harvest and silvicultural practices. Deer, grouse, bear, band-tailed pigeon, and other woodland wildlife are heavily dependent on the vegetative cover produced by the soils in this group.

*Habitat-Soil Group V—Open Uplands.* The major soils in this group are Dedrick and Goulding soils. These soils are on mountains. They are shallow and somewhat excessively drained. Oaks and other trees grow as scattered individuals or in small groves throughout the grasslands. Xerorthents also are in this group.

Vegetation is primarily grass and other herbaceous plants. This group provides important edge habitat in extensively forested areas. The diversity of habitat created by these openings in the woodland is important to many wildlife species.

### Managing and Improving Wildlife Habitat

Habitat-soil groups provide a guide to the potential wildlife habitat in areas of the various soils, but the soils within each group have varying characteristics that determine the potential and feasibility of managing or improving habitat. Plant succession and the density and diversity of plants also are important aspects to be considered.

Drinking water is of prime importance for wildlife, especially during dry seasons. Springs or seeps should be protected and improved, if necessary, so that water is available for wildlife. Water-retention structures, such as ponds, may be needed to improve wildlife habitat. Soils information affecting embankments and reservoir areas is provided for each soil in table 12.

## Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section. The specific criteria used to determine soil limitations are given in appendix B.

*Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.*

*The information is not site specific and does not eliminate the need for onsite investigation of the soils or*

*for testing and analysis by personnel experienced in the design and construction of engineering works.*

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, and natural soil structure aggregation. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

### Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

*Shallow excavations* are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture.

*Dwellings* and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. Flooding and shrinking and swelling can cause the movement of footings. The depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

*Local roads and streets* have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil) and the shrink-swell potential affect the traffic-supporting capacity.

*Lawns and landscaping* require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface

layer affect trafficability after vegetation is established.

**Sanitary Facilities**

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

*Septic tank absorption fields* are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field or if slope is excessive. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

*Sewage lagoons* are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

*Sanitary landfills* are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, and soil reaction affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

*Daily cover for landfill* is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick

enough over bedrock or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

**Construction Materials**

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

*Roadfill* is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel, or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

*Sand* and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the taxonomic unit descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

*Topsoil* is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large

amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils generally is preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

**Water Management**

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

*Pond reservoir areas* hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

*Embankments, dikes, and levees* are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even more than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

*Drainage* is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, slope, and susceptibility to flooding. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity. Availability of drainage outlets is not considered in the ratings.

*Irrigation* is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone and by soil reaction.

*Terraces and diversions* are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

*Grassed waterways* are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. Low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

# Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

## Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

*Depth* to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under the heading "Soil Series and Their Morphology."

*Texture* is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

*Classification* of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

*Rock fragments* 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in

the field to weight percentage.

*Percentage (of soil particles) passing designated sieves* is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

*Liquid limit* and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

## Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under the heading "Soil Series and Their Morphology."

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

*Permeability* refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

*Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

*Soil reaction* is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

*Shrink-swell potential* is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

*Erosion factor K* indicates the susceptibility of a soil to sheet and rill erosion. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (as much as 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion.

Values of K for soils that formed in granitic rocks do not accurately reflect the very severe erodibility of these soils when they are disturbed and do not reflect the potential for soil loss from gully erosion or streambank erosion, which are major problems in areas of these soils.

*Erosion factor T* is an estimate of the maximum average rate of soil erosion by water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition. In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

## Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

*Flooding*, the temporary covering of the soil surface by flowing water, is caused by overflow from streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered to be flooding. Standing water in swamps and marshes or in closed depressional areas is considered to be ponding.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable, *rare* that it is unlikely but is possible under unusual weather conditions (the chance of flooding in any year is 0 to 5 percent), *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding in any year is 5 to 50 percent), and *frequent* that it occurs often under normal weather conditions (the chance of flooding in any year is more than 50 percent).

Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that flooding is most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and level of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

*High water table* (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table usually is highest. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water

in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower water table by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

*Depth to bedrock* is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

*Risk of corrosion* pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

# Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Xeralf (*Xer*, meaning xeric moisture regime, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haploxeralfs (*Hapl*, meaning minimal horizonation, plus *xeralf*, the suborder of the Alfisols that has a xeric moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Ultic Haploxeralfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is loamy-skeletal, mixed, mesic Ultic Haploxeralfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

## Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each unit. A pedon, a small three-dimensional area of soil, that is typical of the unit in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1975). Unless otherwise stated, matrix colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each series or other taxonomic unit are described in the section "Detailed Soil Map Units."

### Atter Series

The Atter series consists of very deep, somewhat excessively drained soils on alluvial fans and stream terraces. These soils formed in alluvium and outwash from hydraulic mining of mixed rock sources. Slopes range from 2 to 15 percent. Mean annual precipitation is

30 to 40 inches. Mean annual air temperature is about 54 degrees F.

These soils are sandy-skeletal, mixed, mesic Typic Xerorthents.

Typical pedon of Atter extremely gravelly loamy sand, 9 to 15 percent slopes; about 2¼ miles southeast of Helena; 100 feet east and 2,300 feet north of the southwest corner of sec. 35, T. 34 N., R. 11 W., Dedrick quadrangle.

Rock fragments cover 25 to 40 percent of the surface.

Oi—1 inch to 0; leaves, needles, and twigs, some decomposed.

A1—0 to 1 inch; light brownish gray (2.5Y 6/2) extremely gravelly loamy sand, grayish brown (2.5Y 5/2) moist; single grain; loose, nonsticky and nonplastic; common fine and very fine roots; many fine and very fine interstitial pores; about 20 percent gravel and 15 percent cobbles on the surface; 70 percent gravel and 10 percent cobbles in the horizon; slightly acid (pH 6.5); clear smooth boundary.

A2—1 to 8 inches; pale yellow (2.5Y 7/4) extremely gravelly loamy sand, light olive brown (2.5Y 5/4) moist; single grain; loose, nonsticky and nonplastic; common fine and very fine and few medium roots; many fine and very fine interstitial pores; about 70 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); clear smooth boundary.

C1—8 to 41 inches; brownish yellow (10YR 6/6) extremely gravelly loamy sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic; few medium and fine roots; many fine and very fine interstitial pores; about 70 percent gravel and 10 percent cobbles; neutral (pH 7.0); gradual wavy boundary.

C2—41 to 60 inches; brownish yellow (10YR 6/6) extremely gravelly loamy sand, yellowish brown (10YR 5/6) moist; massive; soft, very friable, nonsticky and nonplastic; few medium and fine roots; common fine and very fine interstitial pores and few medium tubular pores; about 70 percent gravel and 10 percent cobbles; slightly acid (pH 6.5).

The A horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 6. When moist, it has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 to 4. This horizon contains 65 to 70 percent gravel.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 to 8. When moist, it has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. This horizon is typically extremely gravelly loamy sand, but in some pedons it has thin layers of extremely gravelly sandy loam. It contains 55 to 75 percent gravel and 10 to 15 percent cobbles.

The Atter soils in this survey area differ from the concept of the series because they are dominated by gravelly materials deposited from recent hydraulic mining activities. The average content of rock fragments is more than 60 percent in the control section. This difference, however, does not affect the use or management of the soils.

## Azule Series

The Azule series consists of moderately deep, well drained soils on hills. These soils formed in material weathered from mudstone. Slopes range from 15 to 30 percent. Mean annual precipitation is 40 to 50 inches. Mean annual air temperature is about 58 degrees F.

These soils are fine, montmorillonitic, thermic Mollic Haploxeralfs.

Typical pedon of Azule silty clay loam, in an area of Millsholm-Azule complex, 15 to 30 percent slopes; about 4.5 miles southeast of Douglas City; 1,200 feet east and 1,300 feet north of the southwest corner of sec. 28, T. 32 N., R. 9 W., Hoosimbim Mountain quadrangle.

Oi—½ inch to 0; leaves, grass stems, and twigs.

A—0 to 4 inches; light gray (10YR 7/2) silty clay loam, dark brown (10YR 3/3) moist; strong medium and fine subangular blocky structure; hard, friable, sticky and plastic; common fine and very fine roots; few fine and common very fine tubular pores; about 5 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt1—4 to 8 inches; very pale brown (10YR 7/3) clay, brown (10YR 4/3) moist; moderate medium subangular blocky structure; very hard, firm, very sticky and very plastic; common fine and very fine roots; few fine and common very fine tubular pores; few thin clay films lining pores and on faces of peds; about 5 percent gravel; neutral (pH 7.0); gradual wavy boundary.

Bt2—8 to 16 inches; very pale brown (10YR 7/3) clay, brown (10YR 4/3) moist; moderate coarse subangular blocky structure; very hard, very firm, very sticky and very plastic; common fine and very fine roots; few fine interstitial and few very fine tubular pores; many thin clay films lining pores and on faces of peds; about 5 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt3—16 to 26 inches; light yellowish brown (10YR 6/4) clay, brown (10YR 4/3) moist; weak coarse subangular blocky structure; very hard, very firm, very sticky and very plastic; few medium and coarse and common fine and very fine roots; few fine

interstitial pores and few very fine tubular pores; many thin clay films lining pores and on faces of peds; about 5 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt4—26 to 36 inches; light yellowish brown (10YR 6/4) clay, brown (10YR 4/3) moist; massive; very hard, very firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; few thin clay films lining pores; about 5 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Cr—36 inches; weakly consolidated mudstone, soft when moist; cracks form angular fragments.

The depth to weakly consolidated mudstone is 20 to 40 inches.

The A horizon has hue of 10YR, value of 3 to 7, and chroma of 2 to 6. When moist, it has hue of 10YR, value of 3, and chroma of 3 or 4.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 7, and chroma of 3 to 6. When moist, it has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. This horizon is clay or gravelly clay.

The Azule soils in this survey area are dry for shorter periods in the summer and have lighter colors when dry than are defined as the range for the series. Also, they have subangular blocky structure in the upper part of the Bt horizon. These differences, however, do not affect the use or management of the soils.

## Bamtush Series

The Bamtush series consists of very deep, well drained soils on mountains. These soils formed in residuum and colluvium derived from metavolcanic, sedimentary, or metasedimentary rocks. Slopes range from 15 to 75 percent. Mean annual precipitation is 40 to 60 inches. Mean annual air temperature is about 50 degrees F.

These soils are loamy-skeletal, mixed, mesic Ultic Palexeralfs.

Typical pedon of Bamtush extremely gravelly loam, in an area of Hoosimbim-Bamtush-Marpa complex, 30 to 50 percent slopes; about 4 miles northwest of Hoosimbim Mountain; 2,000 feet east and 1,450 feet south of the northwest corner of sec. 20, T. 32 N., R. 10 W., Hayfork Summit quadrangle.

About 30 percent of the surface is partially covered with gravel.

Oi—2 inches to 0; needles, leaves, twigs, branches, and cones.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) extremely gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; common fine and very fine interstitial pores; about 65 percent gravel in the horizon; slightly acid (pH 6.5); clear wavy boundary.

A2—2 to 6 inches; brown (10YR 5/3) extremely gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, very fine, and medium roots; common fine and very fine interstitial pores; about 65 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

BAt—6 to 14 inches; yellowish brown (10YR 5/4) very gravelly loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; common fine and very fine tubular pores; few thin clay films lining pores; about 60 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.

Bt1—14 to 21 inches; brown (7.5YR 5/4) very gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few medium and common fine and very fine roots; few medium and common fine and very fine tubular pores; few thin clay films lining pores and on faces of peds; about 50 percent gravel and 10 percent cobbles; strongly acid (pH 5.5); gradual wavy boundary.

Bt2—21 to 33 inches; reddish yellow (7.5YR 7/6) very gravelly sandy clay loam, strong brown (7.5YR 5/6) moist; moderate medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine and very fine tubular pores; few thin clay films lining pores and on faces of peds; about 50 percent gravel and 10 percent cobbles; strongly acid (pH 5.5); gradual wavy boundary.

Bt3—33 to 47 inches; reddish yellow (7.5YR 7/6) very gravelly sandy clay loam, strong brown (7.5YR 5/6) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; common fine and very fine tubular pores; few thin clay films lining pores and on faces of peds; about 50 percent gravel and 10 percent cobbles; strongly acid (pH 5.5); gradual wavy boundary.

Bt4—47 to 67 inches; reddish yellow (7.5YR 7/6) very gravelly sandy clay loam, strong brown (7.5YR 5/6) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; common fine and very fine tubular pores; few thin clay films lining pores

and on faces of peds; about 50 percent gravel and 10 percent cobbles; strongly acid (pH 5.5).

The A horizon has hue of 10YR or 7.5YR, value of 4 to 7, and chroma of 2 to 4. When moist, it has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 to 6. This horizon is moderately acid to neutral.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 2 to 8. When moist, it has hue of 5YR to 10YR, value of 3 to 5, and chroma of 4 to 8. In all pedons, this horizon has hue redder than 10YR and chroma of more than 4 in at least the lower part of the Bt horizon. The Bt horizon is very gravelly sandy clay loam, very gravelly loam, or very gravelly clay loam. It contains 35 to 55 percent gravel and 0 to 10 percent cobbles with a combined average of 35 to 60 percent. It contains 25 to 35 percent clay. It is strongly acid to slightly acid.

The Bamtush soils in this survey area are dry for fewer days and have a lower mean annual soil temperature than are defined as the range for the series. These differences, however, do not affect the use or management of the soils.

## Bamtush Variant

The Bamtush Variant consists of very deep, well drained soils on mountains and old landslides. These soils formed in residuum and colluvium derived from ultrabasic rocks. Slopes range from 9 to 75 percent. Mean annual precipitation is 55 to 65 inches. Mean annual air temperature is about 47 degrees F.

These soils are loamy-skeletal, oxidic, mesic Haplic Palexeralfs.

Typical pedon of Bamtush Variant very gravelly loam, in an area of Weitchpec Variant-Bamtush Variant complex, 50 to 75 percent slopes; about 3 miles southwest of Lewiston, California; 2,050 feet east and 1,500 feet south of the northwest corner of sec. 6, T. 32 N., R. 8 W., Lewiston quadrangle.

About 1 percent of the surface is partially covered with stones, 10 percent with cobbles, and 10 percent with gravel.

Oi—2 inches to 0; needles, twigs, bark, and leaves.

A—0 to 2 inches; yellowish red (5YR 4/6) very gravelly loam, dark reddish brown (5YR 3/4) moist; moderate fine and very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; few fine and many very fine tubular pores; about 40 percent gravel; neutral (pH 7.0); clear smooth boundary.

BAt—2 to 6 inches; yellowish red (5YR 4/6) very gravelly loam, dark reddish brown (5YR 3/4) moist; weak medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; few medium and many fine and very fine tubular pores; few thin clay films lining pores; about 40 percent gravel; mildly alkaline (pH 7.5); clear wavy boundary.

Bt1—6 to 15 inches; yellowish red (5YR 4/6) very gravelly loam, reddish brown (5YR 4/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine, very fine, and coarse roots and many medium roots; few fine and common very fine tubular pores; common thin clay films lining pores and on faces of peds; about 30 percent gravel and 10 percent cobbles; mildly alkaline; (pH 7.5); gradual wavy boundary.

Bt2—15 to 27 inches; yellowish red (5YR 4/6) very gravelly clay loam, reddish brown (5YR 4/4) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; few fine, very fine, and medium roots; few medium and common fine and very fine tubular pores; common thin clay films lining pores and on faces of peds; about 45 percent gravel and 10 percent cobbles; mildly alkaline (pH 7.5); gradual wavy boundary.

Bt3—27 to 50 inches; yellowish red (5YR 4/6) extremely gravelly clay loam, reddish brown (5YR 4/4) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; few medium, fine, and very fine roots; few coarse and fine and common very fine tubular pores; common thin clay films lining pores and on faces of peds; about 45 percent gravel and 15 percent cobbles; mildly alkaline (pH 7.5); gradual wavy boundary.

Bt4—50 to 69 inches; yellowish red (5YR 4/6) extremely gravelly clay loam, reddish brown (5YR 4/4) moist; weak medium and fine subangular blocky structure; hard, friable, sticky and plastic; few fine, very fine, and medium roots; few fine and very fine tubular pores; common thin clay films lining pores; about 45 percent gravel and 15 percent cobbles; mildly alkaline (pH 7.5); gradual wavy boundary.

BCt—69 to 78 inches; yellowish red (5YR 4/6) extremely gravelly clay, reddish brown (5YR 4/4) moist; massive; very hard, firm, sticky and plastic; few very fine tubular pores; few thin clay films lining pores and occurring as bridges; about 40 percent gravel and 20 percent cobbles; mildly alkaline (pH 7.5).

The A horizon has hue of 5YR, value of 4, and chroma of 3 to 6. It is very gravelly loam or loam. It contains 17 to 25 percent clay.

The Bt horizon has hue of 5YR, value of 4 to 6, and

chroma of 3 to 6. It is very gravelly loam, very gravelly clay loam, or extremely gravelly clay loam. It contains 25 to 35 percent clay and 35 to 70 percent rock fragments. It contains 5 to 8 percent more clay than the A horizon.

## Barpeak Series

The Barpeak series consists of very deep, well drained soils on mountains. These soils formed in colluvium weathered from mica schist. Slopes range from 50 to 90 percent. Mean annual precipitation is 60 to 70 inches. Mean annual air temperature is about 47 degrees F.

These soils are loamy-skeletal, mixed, mesic Dystric Xerochrepts.

Typical pedon of Barpeak very gravelly loam, in an area of Barpeak-Sheetiron complex, 50 to 90 percent slopes; about 7.5 miles southeast of Douglas City; 200 feet east and 1,000 feet south of the northwest corner of sec. 1, T. 31 N., R. 9 W., Bully Choop Mountain quadrangle.

About 25 percent of the surface is partially covered with gravel.

Oi—2 inches to 0; needles, leaves, twigs, cones, and branches.

A—0 to 3 inches; yellowish brown (10YR 5/4) very gravelly loam, dark yellowish brown (10YR 3/4) moist; moderate very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and many very fine roots; common fine and very fine tubular pores; about 55 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bw1—3 to 8 inches; brown (7.5YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium, fine, and very fine roots; common fine and very fine tubular pores; about 55 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bw2—8 to 15 inches; light yellowish brown (10YR 6/4) extremely gravelly sandy loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; common fine and very fine tubular pores; about 65 percent gravel; neutral (pH 7.0); clear wavy boundary.

BCt1—15 to 28 inches; brown (7.5YR 5/4) extremely gravelly sandy loam, strong brown (7.5YR 4/6) moist; massive; hard, friable, slightly sticky and slightly plastic; few coarse and common medium, fine, and very fine roots; few fine and very fine tubular pores; few thin clay films lining pores; about 55 percent gravel and 20 percent cobbles; slightly acid (pH 6.5); gradual wavy boundary.

BCt2—28 to 38 inches; pink (7.5YR 7/4) extremely gravelly sandy clay loam, yellowish brown (10YR 5/6) moist; massive; hard, friable, slightly sticky and slightly plastic; few coarse, medium, and fine roots and common very fine roots; few fine and very fine tubular pores; few thin clay films lining pores; about 60 percent gravel and 20 percent cobbles; slightly acid (pH 6.5); gradual wavy boundary.

BCt3—38 to 60 inches; pink (7.5YR 7/4) extremely gravelly sandy clay loam, yellowish brown (10YR 5/6) moist; massive; hard, friable, slightly sticky and slightly plastic; few medium, fine, and very fine roots; few fine and very fine tubular pores; few thin clay films lining pores; about 60 percent gravel and 20 percent cobbles; slightly acid (pH 6.5).

The particle-size control section has 35 to 80 percent rock fragments, mostly gravel and cobbles, and 18 to 25 percent clay. The extent of the surface covered by gravel ranges from 15 to 60 percent.

The A horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 or 4. When moist, it has hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 4.

The Bw horizon has hue of 5YR to 10YR, value of 4 to 7, and chroma of 2 to 6. When moist, it has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6. This horizon is very gravelly sandy loam, extremely gravelly sandy loam, or very gravelly loam. It is moderately acid to neutral.

Some pedons do not have a BCt horizon. The BCt horizon, if it occurs, is extremely gravelly loam or extremely gravelly sandy clay loam. The percent clay increase is less than 1.2 times the amount in the horizon above.

## Beargulch Series

The Beargulch series consists of deep, well drained soils on mountains. These soils formed in colluvium weathered from mica schist. Slopes range from 50 to 75 percent. Mean annual precipitation is 60 to 70 inches. Mean annual air temperature is about 44 degrees F.

These soils are loamy-skeletal, mixed, frigid Dystric Xerochrepts.

Typical pedon of Beargulch very gravelly loam, in an area of Beargulch-Skyrock complex, 50 to 75 percent slopes; about one-half mile southwest of Gunsight Peak; 1,100 feet north of the southeast corner of sec. 13, T. 31 N., R. 9 W., Bully Choop Mountain quadrangle.

About 40 percent of the surface is partially covered with gravel.

Oi—1 inch to 0; needles, leaves, twigs, branches, and cones.

A—0 to 5 inches; yellowish brown (10YR 5/4) very gravelly loam, dark yellowish brown (10YR 3/6) moist; moderate very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; common fine and very fine tubular pores; about 45 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.

Bt1—5 to 12 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark brown (7.5YR 3/4) moist; moderate very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse, medium, and fine roots and many very fine roots; common fine and very fine tubular pores; few clay films bridging mineral grains; about 50 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.

Bt2—12 to 25 inches; very pale brown (10YR 7/4) extremely gravelly sandy loam, dark yellowish brown (10YR 3/6) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; common fine and very fine tubular pores; few clay films bridging mineral grains; about 50 percent gravel and 15 percent cobbles; slightly acid (pH 6.5); gradual wavy boundary.

Bt3—25 to 43 inches; very pale brown (10YR 7/4) extremely gravelly sandy loam, dark yellowish brown (10YR 4/6) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few coarse and common medium, fine, and very fine roots; common fine and very fine tubular pores; few clay films bridging mineral grains; about 60 percent gravel and 20 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

R—43 inches; hard, fractured mica schist; fragments are 4 to 8 inches in diameter; fractures are filled with small fragments of weathered rock and some fine roots.

The depth to bedrock ranges from 40 to 60 inches. The particle-size control section contains 45 to 80 percent rock fragments and 15 to 25 percent clay. Reaction is moderately acid or slightly acid throughout the profile.

The A horizon has hue of 10YR, value of 5 or 6, and chroma of 4. When moist, it has hue of 10YR, value of 3 or 4, and chroma of 3 to 6.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 6. When moist, it has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 4 to 6. This horizon is very gravelly loam, extremely gravelly sandy loam, or extremely gravelly loam.

## Brockgulch Series

The Brockgulch series consists of moderately deep, well drained soils on mountains. These soils formed in residuum amd colluvium derived from metavolcanic rocks. Slopes range from 50 to 75 percent. Mean annual precipitation is 40 to 55 inches. Mean annual air temperature is about 60 degrees F.

These soils are loamy-skeletal, mixed, thermic Typic Xerochrepts.

Typical pedon of Brockgulch very gravelly loam, in an area of Brockgulch-Dedrick-Brownbear complex, 50 to 75 percent slopes; about 2.5 miles northeast of Helena; 1,400 feet south and 100 feet east of the northwest corner of sec. 23, T. 34 N., R. 11 W., Dedrick quadrangle.

About 60 percent of the surface is covered with gravel and 5 percent with cobbles. Scattered leaves mixed with gravel are on the surface.

A—0 to 3 inches; brown (7.5YR 4/4) very gravelly loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and fine and common very fine roots; few fine and common very fine tubular pores; about 40 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt1—3 to 11 inches; brown (7.5YR 4/4) very gravelly loam, dark brown (7.5YR 3/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few coarse, medium, and fine roots and common very fine roots; few medium and fine and common very fine tubular pores; few thin clay bridges between mineral grains; about 55 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt2—11 to 16 inches; strong brown (7.5YR 4/6) very gravelly loam, brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; few fine and very fine tubular pores; few thin clay bridges between mineral grains; about 55 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

C—16 to 24 inches; strong brown (7.5YR 4/6) extremely gravelly loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and coarse and common fine and very fine roots; few

fine and very fine tubular pores; about 60 percent gravel and 10 percent cobbles; moderately acid (pH 6.0); abrupt wavy boundary.
R—24 inches; fractured schist.

The depth to bedrock ranges from 20 to 40 inches. The content of rock fragments on the surface ranges from 15 to 70 percent. The rock fragments are mostly gravel. The control section averages 35 to 65 percent rock fragments and contains 15 to 25 percent clay.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. When moist, it has hue of 7.5YR or 10YR, value of 3, and chroma of 3 or 4. This horizon is slightly acid or neutral.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. When moist, it has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 3 to 6. This horizon is slightly acid or neutral.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. When moist, it has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 4 to 6. This horizon is extremely gravelly loam, extremely gravelly sandy clay loam, or very gravelly loam.

## Brockgulch Variant

The Brockgulch Variant consists of moderately deep, well drained soils on mountain spur ridges. These soils formed in material weathered from mica schist. Slopes range from 30 to 50 percent. Mean annual precipitation is 40 to 50 inches. Mean annual air temperature is about 59 degrees F.

These soils are loamy-skeletal, oxidic, thermic Mollic Haploxeralfs.

Typical pedon of Brockgulch Variant loam, in an area of Springgulch-Brockgulch Variant complex, 30 to 50 percent slopes; about 4¾ miles southeast of Douglas City; 400 feet west and 2,500 feet north of the southeast corner of sec. 22, T. 32 N., R. 9 W., Bully Choop Mountain quadrangle.

About 5 percent of the surface is covered with gravel.

Oi—1 inch to 0; leaves and twigs.
A—0 to 2 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; strong fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine and very fine tubular pores; about 10 percent gravel; neutral (pH 7.0); clear wavy boundary.
Bt1—2 to 5 inches; reddish brown (5YR 4/4) gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; few fine and very fine tubular pores; few thin clay films lining pores; about 30 percent gravel; neutral (pH 7.0); clear wavy boundary.
Bt2—5 to 11 inches; yellowish red (5YR 5/6) very gravelly clay loam, reddish brown (5YR 4/4) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; common medium, fine, and very fine roots; few fine and very fine tubular pores; few thin clay films lining pores and on faces of peds; about 40 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.
Bt3—11 to 18 inches; yellowish red (5YR 5/6 and 5/8) very gravelly clay loam, yellowish red (5YR 4/6) moist; moderate medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; few fine and very fine tubular pores; common thin clay films lining pores and on faces of peds; about 45 percent gravel; moderately acid (pH 6.0); clear wavy boundary.
BCt—18 to 31 inches; yellowish red (5YR 5/6 and 5/8) very gravelly loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few medium and fine and common very fine roots; few fine and very tubular pores; common thin clay films lining pores and on faces of peds; about 40 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.
R—31 inches; broken, platy mica schist; fragments are 1 to 3 inches in diameter and less than 2 inches thick; very few roots in fractures.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches.

The A horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is neutral or slightly acid.

The Bt horizon is moderately acid to neutral.

## Brownbear Series

The Brownbear series consists of moderately deep, well drained soils on mountains. These soils formed in residuum and colluvium derived from metavolcanic or sedimentary rocks. Slopes range from 15 to 75 percent. Mean annual precipitation is 40 to 55 inches. Mean annual air temperature is about 55 degrees F.

These soils are loamy-skeletal, mixed, mesic Typic Xerochrepts.

Typical pedon of Brownbear very gravelly loam, in an area of Brockgulch-Dedrick-Brownbear complex, 50 to 75 percent slopes; about 3 miles northwest of Helena; 1,100 feet east and 2,400 feet south of the northwest corner of sec. 14, T. 34 N., R. 11 W., Dedrick quadrangle.

About 30 percent of the surface is partially covered with gravel.

Oi—1 inch to 0; needles, leaves, and twigs mixed with gravel.
A—0 to 4 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 3/4) moist; moderate very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common medium and fine and many very fine roots; common very fine and fine tubular pores; about 35 percent gravel and 5 percent soft, weathered gravel; slightly acid (pH 6.5); clear wavy boundary.
Bt1—4 to 9 inches; light brown (7.5YR 6/4) very gravelly loam, brown (7.5YR 4/4) moist; moderate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots and few coarse roots; common fine and very fine tubular pores; common thin clay films lining pores and bridging mineral grains; about 35 percent gravel and 5 percent soft, weathered gravel; neutral (pH 7.0); gradual wavy boundary.
Bt2—9 to 16 inches; light brown (7.5YR 6/4) gravelly clay loam, brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium, fine, and very fine roots and few coarse roots; few fine and common very fine tubular pores; common thin clay films lining pores and occurring as bridges between mineral grains; about 25 percent gravel and 5 percent soft, weathered gravel; neutral (pH 7.0); gradual wavy boundary.
Bt3—16 to 22 inches; light brown (7.5YR 6/4) very gravelly clay loam, strong brown (7.5YR 4/6) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few coarse and medium and common fine and very fine roots; few fine and common very fine tubular pores; common thin clay films lining pores and on faces of peds; about 40 percent gravel, 5 percent cobbles, and 10 percent soft, weathered gravel; neutral (pH 7.0); clear wavy boundary.
C—22 to 32 inches; brownish yellow (10YR 6/6) extremely gravelly clay loam, yellowish brown (10YR 5/6) moist; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and common very fine roots; few very fine tubular pores; about 65 percent gravel, 10 percent cobbles, and 10 percent soft, weathered gravel; slightly acid (pH 6.5); abrupt wavy boundary.
R—32 inches; fractured schist, extremely broken; more weathered in the upper 2 inches; common very fine roots in fractures.

The depth to bedrock ranges from 20 to 40 inches. The control section averages 35 to 60 percent rock fragments. Reaction ranges from strongly acid to neutral throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. When moist, it has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. This horizon contains 20 to 25 percent clay.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 4 to 8. When moist, it has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 6. This horizon is very gravelly loam, gravelly clay loam, gravelly loam, extremely gravelly loam, extremely gravelly sandy clay loam, or very gravelly clay loam. It contains 23 to 30 percent clay and 30 to 75 percent rock fragments.

The C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 6. When moist, it has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. This horizon is extremely gravelly loam, extremely gravelly clay loam, or extremely gravelly sandy clay loam.

## Brownscreek Series

The Brownscreek series consists of moderately deep, well drained soils on mountains. These soils formed in residuum and colluvium derived from mica schist. Slopes range from 30 to 75 percent. The mean annual precipitation is 30 to 60 inches. Mean annual air temperature is about 55 degrees F.

These soils are loamy-skeletal, oxidic, mesic Ultic Haploxeralfs.

Typical pedon of Brownscreek gravelly loam, in an area of Brownscreek-Dougcity complex, 30 to 50 percent slopes; about 2.5 miles southwest of Douglas City; 2,200 feet east and 2,150 feet north of the southwest corner of sec. 10, T. 32 N., R. 10 W., Weaverville quadrangle.

About 30 percent of the surface is covered with platy gravel, and 2 percent is covered with cobbles.

Oi—1 inch to 0; leaves and needles.
A—0 to 6 inches; strong brown (7.5YR 5/6) gravelly loam, brown (7.5YR 4/4) moist; moderate fine and very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many coarse and common medium, fine, and very fine roots; few coarse and common fine and very fine tubular pores; about 20 percent gravel; neutral (pH 7.0); clear wavy boundary.

BA—6 to 13 inches; reddish yellow (7.5YR 6/6) very gravelly loam, strong brown (7.5YR 4/6) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many coarse and common medium, fine, and very fine roots; few medium and common fine and very fine tubular pores; about 35 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); gradual wavy boundary.

Bt1—13 to 24 inches; reddish yellow (7.5YR 6/8) very gravelly clay loam, strong brown (7.5YR 4/6) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common medium, fine, and very fine roots; few fine and common very fine tubular pores; common thin clay films lining pores and on faces of peds; about 35 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—24 to 34 inches; reddish yellow (7.5YR 6/8) extremely gravelly loam, strong brown (7.5YR 4/6) moist; weak medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few medium and common fine and very fine roots; few very fine tubular pores; few thin clay films lining pores and on faces of peds; about 65 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

R—34 inches; extremely fractured mica schist; clay films and black stains lining fractures; fractures are about 1 to 2 inches apart.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The extent of the surface covered by rock fragments ranges from 5 to 50 percent.

The A horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 2 to 6. When moist, it has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 6. This horizon ranges from moderately acid to neutral.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 7, and chroma of 3 to 8. When moist, it has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 8. This horizon is very gravelly clay loam, very gravelly loam, extremely gravelly clay loam, very gravelly sandy clay loam, or extremely gravelly loam. It contains 35 to 75 percent rock fragments and 25 to 30 percent clay. It ranges from strongly acid to slightly acid.

## Cargent Series

The Cargent series consists of moderately deep, well drained soils on mountains. These soils formed in colluvium and material weathered from mica schist. Slopes range from 50 to 90 percent. Mean annual precipitation is 40 to 60 inches. Mean annual air temperature is about 59 degrees F.

These soils are loamy-skeletal, mixed, thermic Dystric Xerochrepts.

Typical pedon of Cargent very gravelly sandy clay loam, in an area of Cargent-Demogul association, 50 to 75 percent slopes; about 3.5 miles southwest of Douglas City; 2,100 feet west and 1,450 feet south of the northeast corner of sec. 26, T. 32 N., R. 10 W., Hoosimbim Mountain quadrangle.

About 60 percent of the surface is partially covered with gravel.

Oi—1 inch to 0; leaves and twigs.

A—0 to 3 inches; brown (7.5YR 5/4) very gravelly sandy clay loam, dark brown (7.5YR 3/4) moist; moderate fine and very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common medium, fine, and very fine roots; common fine and very fine tubular pores; about 40 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt1—3 to 12 inches; light brown (7.5YR 6/4) very gravelly clay loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium, fine, and very fine roots; few fine and common very fine tubular pores; few thin clay films lining pores and bridging mineral grains; about 35 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—12 to 21 inches; light brown (7.5YR 6/4) very gravelly clay loam, brown (7.5YR 4/4) moist; strong medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and common fine and very fine roots; few fine and common very fine tubular pores; common thin clay films lining pores and bridging mineral grains; about 45 percent gravel and 5 percent cobbles; slightly acid (pH 6.1); gradual wavy boundary.

BCt—21 to 32 inches; light brown (7.5YR 6/4) extremely gravelly loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and common very fine roots; few fine and common very fine tubular pores; few thin clay films lining pores and bridging mineral grains; about 55 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

R—32 inches; fractured, platy mica schist.

The depth to bedrock ranges from 20 to 40 inches. Reaction is slightly acid or neutral throughout the profile. The particle-size control section averages 35 to 50 percent rock fragments. The extent of the surface

covered by rock fragments ranges from 15 to 60 percent.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4. When moist, it has hue of 7.5YR or 10YR, value of 3, and chroma of 3 or 4.

The B horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 3 to 6. When moist, it has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 3 to 6. This horizon is very gravelly clay loam, very gravelly loam, extremely gravelly loam, or extremely gravelly clay loam. It contains 20 to 30 percent clay.

## Caris Series

The Caris series consists of moderately deep, well drained soils on mountains. These soils formed in colluvium and material weathered from metasedimentary rocks. Slopes range from 50 to 90 percent. Mean annual precipitation is 30 to 60 inches. Mean annual air temperature is about 47 degrees F.

These soils are loamy-skeletal, mixed, mesic Typic Xerochrepts.

Typical pedon of Caris extremely gravelly sandy loam, 75 to 90 percent slopes; about 1.5 miles north of Hoosimbim Mountain; 1,300 feet west and 2,700 feet north of the southeast corner of sec. 33, T. 32 N., R. 10 W., Hoosimbim Mountain quadrangle.

About 60 percent of the surface is partially covered with gravel.

Oi—1 inch to 0; scattered needles, leaves, twigs, and cones.

A—0 to 3 inches; light brownish gray (2.5Y 6/2) extremely gravelly sandy loam, very dark grayish brown (2.5Y 3/2) moist; strong very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and many very fine roots; common fine and very fine tubular pores; about 65 percent gravel in the horizon; slightly acid (pH 6.5); clear wavy boundary.

Bw—3 to 14 inches; light gray (2.5Y 7/2) extremely gravelly loam, grayish brown (2.5Y 5/2) moist; moderate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and common fine and very fine roots; common fine and very fine tubular pores; about 60 percent gravel and 10 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

C1—14 to 22 inches; light gray (2.5Y 7/2) extremely gravelly loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and common very fine roots; few fine and common very fine tubular pores; about 60 percent gravel and 10 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

C2—22 to 33 inches; light gray (2.5Y 7/2) extremely gravelly sandy loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and common very fine roots; few fine and very fine tubular pores; about 65 percent gravel and 20 percent cobbles; moderately acid (pH 6.0); abrupt wavy boundary.

R—33 inches; fractured metasedimentary rock; roots extend into some fractures.

The depth to bedrock ranges from 20 to 40 inches.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. When moist, it has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 2 or 3.

The Bw horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 4. When moist, it has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 6. This horizon is extremely gravelly loam, extremely gravelly sandy loam, or very gravelly loam. It contains 45 to 70 percent rock fragments, mostly gravel, and 18 to 27 percent clay.

The C horizon is extremely gravelly sandy loam or extremely gravelly loam.

The Caris soils in this survey area are dry for fewer days, have higher precipitation, and have a shorter frost-free season than are defined as the range for the series. Also, they have lower chroma and yellower hue. These differences, however, do not affect the use or management of the soils.

## Carrcreek Series

The Carrcreek series consists of very deep, well drained soils on stream terraces and alluvial fans. These soils formed in alluvium derived from mixed rock sources. Slopes range from 0 to 5 percent. Mean annual precipitation is 30 to 40 inches. Mean annual air temperature is about 54 degrees F.

These soils are loamy-skeletal, mixed, mesic Pachic Argixerolls.

Typical pedon of Carrcreek gravelly loam, 0 to 2 percent slopes; 6 miles northeast of Hayfork; 2,100 feet east and 2,000 feet north of the southwest corner of sec. 35, T. 32 N., R. 11 W., Hayfork Summit quadrangle.

Ap—0 to 8 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; strong medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and many very fine roots; many fine and very fine

tubular pores; about 20 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

A—8 to 12 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; few fine and many very fine tubular pores; about 25 percent gravel and 5 percent cobbles; neutral (pH 7.0); gradual wavy boundary.

Bt1—12 to 29 inches; brown (10YR 5/3) very gravelly clay loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; few fine and common very fine roots; few fine and common very fine tubular pores; common thin clay films lining pores and on faces of peds; about 40 percent gravel; mildly alkaline (pH 7.5); gradual wavy boundary.

Bt2—29 to 50 inches; dark yellowish brown (10YR 4/4) very gravelly clay loam, dark yellowish brown (10YR 3/4) moist; moderate fine and very fine subangular blocky structure; very hard, firm, very sticky and very plastic; few fine and very fine roots; few fine and very fine tubular pores; many thin clay films lining pores and on faces of peds; about 45 percent gravel; mildly alkaline (pH 7.5); clear wavy boundary.

2Bt3—50 to 60 inches; dark yellowish brown (10YR 3/4) very gravelly sandy clay loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; very hard, firm, very sticky and plastic; few very fine roots; few fine and very fine tubular pores; many moderately thick clay films lining pores and on faces of peds; about 55 percent gravel; mildly alkaline (pH 7.5).

The thickness of the mollic epipedon ranges from 20 to 35 inches. The particle-size control section averages 24 to 34 percent clay and 35 to 55 percent gravel.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. When moist, it has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. This horizon contains 20 to 25 percent clay and 15 to 35 percent gravel. It is slightly acid or neutral.

The upper part of the Bt horizon has hue of 10YR, value of 5, and chroma of 3. The lower part has hue of 10YR, value of 3 to 5, and chroma of 4 to 6. When moist, the upper part has hue of 10YR, value of 2 or 3, and chroma of 1 to 3 and the lower part has hue of 10YR, value of 3, and chroma of 4. The Bt horizon is very gravelly clay loam, very gravelly loam, or very gravelly sandy clay loam. It is slightly acid to mildly alkaline. Some pedons have a substratum of extremely gravelly loamy coarse sand.

## Choop Series

The Choop series consists of shallow, excessively drained soils on mountains. These soils formed in material weathered from granitic rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is 55 to 70 inches. Mean annual air temperature is about 47 degrees F.

These soils are sandy-skeletal, mixed, mesic, shallow Typic Xerorthents.

Typical pedon of Choop fine gravelly loamy coarse sand, in an area of Valcreek-Minersville-Choop complex, 30 to 75 percent slopes; about ¾ mile northwest of Buckhorn Bally; 4,200 feet south and 1,800 feet west of the northeast corner of sec. 13, T. 32 N., R. 8 W., French Gulch quadrangle.

About 50 percent of the surface is partially covered with gravel.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) fine gravelly loamy coarse sand, very dark brown (10YR 2/2) moist; moderate fine granular structure, thin platiness at the surface; soft, loose, nonsticky and nonplastic; common fine and very fine roots; many fine and very fine interstitial pores; about 20 percent fine gravel; strongly acid (pH 5.5); clear wavy boundary.

A2—2 to 5 inches; gray (10YR 5/1) fine gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few fine and common very fine roots; many fine and very fine interstitial pores; about 20 percent fine gravel; moderately acid (pH 6.0); gradual wavy boundary.

C1—5 to 13 inches; variegated, mostly grayish brown and light gray (10YR 5/2 and 7/2) very gravelly loamy coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; few fine and very fine roots; many fine and very fine interstitial pores; about 35 percent fine gravel; slightly acid (pH 6.5); gradual wavy boundary.

C2—13 to 16 inches; variegated, mostly pale brown and very pale brown (10YR 6/3 and 8/3) extremely gravelly loamy coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many fine and very fine interstitial pores; about 65 percent fine gravel; slightly acid (pH 6.5); clear wavy boundary.

Cr—16 inches; soft, decomposed granitic rock; few very fine roots extending into widely spaced pockets in the more weathered material.

The depth to weathered granitic rock ranges from 10 to 20 inches (fig. 6). Reaction ranges from slightly acid to strongly acid throughout the profile. Fine gravel (2 to

**Figure 6.—A profile of Choop fine gravelly loamy coarse sand. Weathered granitic bedrock is at a depth of about 16 inches. Depth is marked in feet.**

5 millimeters in diameter) covers 20 to 50 percent of the surface.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. When moist, it has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. This horizon contains 15 to 35 percent fine gravel (2 to 5 millimeters in diameter).

The C horizon averages 35 to 60 percent fine gravel.

The Choop soils in map units 126 and 178 have a lower mean annual soil temperature, have a darker, thicker surface layer, and contain more organic matter than are typical for the series. These differences, however, do not affect the use or management of the soils.

## Crefork Series

The Crefork series consists of very deep, well drained soils on hills. These soils formed in material weathered from weakly consolidated mudstone and bedded sedimentary deposits. Slopes range from 2 to 50 percent. Mean annual precipitation is 30 to 40

inches. Mean annual air temperature is about 54 degrees F.

These soils are fine, montmorillonitic, mesic Typic Palexeralfs.

Typical pedon of Crefork clay loam, 15 to 30 percent slopes; 5¼ miles northeast of Hayfork; 1,500 feet west and 1,200 feet south of the northeast corner of sec. 35, T. 32 N., R. 11 W., Hayfork Summit quadrangle.

About 5 percent of the surface is covered with gravel.

A—0 to 5 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common very fine tubular pores; about 5 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

Bt1—5 to 15 inches; brown (10YR 5/3) clay, brown (10YR 5/3) moist; weak medium prismatic structure parting to strong medium and coarse subangular blocky; extremely hard, extremely firm, very sticky and very plastic; few medium and common fine and very fine roots; few medium interstitial pores and common very fine tubular pores; common thin clay films lining pores and on faces of peds; about 5 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

Bt2—15 to 23 inches; light brownish gray (2.5Y 6/2) clay, olive (5Y 5/3) moist; moderate fine, medium, and coarse subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few medium and coarse and common fine and very fine roots; few coarse interstitial pores and common very fine tubular pores; common thin clay films lining pores and on faces of peds; about 5 percent gravel; strongly acid (pH 5.5); gradual wavy boundary.

Bt3—23 to 43 inches; light brownish gray (2.5Y 6/2) clay, olive (5Y 5/3) moist; weak medium and coarse subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; common fine and very fine roots; few very fine interstitial pores and few very fine tubular pores; common thin clay films lining pores and on faces of peds; about 10 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt4—43 to 63 inches; pale brown (10YR 6/3) gravelly clay loam, light olive brown (2.5Y 5/4) moist; weak fine and medium subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few fine and very fine roots; few very fine tubular pores; few thin clay films lining pores and on faces of peds; about 15 percent gravel; slightly acid (pH 6.5).

The average content of clay in the particle-size control section ranges from 40 to 55 percent.

The A horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. When moist, it has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. This horizon is clay loam or loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 to 6. When moist, it has hue of 10YR to 5Y, value of 4 or 5, and chroma of 3 or 4. This horizon is clay, clay loam, gravelly clay loam, or gravelly clay. It contains 40 to 55 percent clay in the upper part and 30 to 40 percent clay in the lower part. The content of clay at the upper boundary of the horizon increases by more than 15 percent over that in the A horizon.

## Dedrick Series

The Dedrick series consists of shallow, somewhat excessively drained soils on mountains. These soils formed in residuum and colluvium derived from metavolcanic rocks. Slopes range from 50 to 90 percent. Mean annual precipitation is 30 to 55 inches. Mean annual air temperature is about 60 degrees F.

These soils are loamy-skeletal, mixed, thermic Lithic Xerochrepts.

Typical pedon of Dedrick very gravelly loam, in an area of Dedrick-Rock outcrop complex, 50 to 75 percent slopes; about 3 miles northeast of Helena; 1,750 feet east and 2,300 feet south of the northwest corner of sec. 14, T. 34 N., R. 11 W., Dedrick quadrangle.

The surface is partially covered by scattered leaves and twigs. About 60 percent is covered with gravel and 10 percent with cobbles.

A—0 to 3 inches; dark yellowish brown (10YR 4/4) very gravelly loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common fine and very fine roots; common very fine and fine tubular pores; about 55 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bw1—3 to 11 inches; yellowish brown (10YR 5/4) extremely gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and common fine and very fine roots; few fine and very fine tubular pores; about 55 percent gravel and 10 percent cobbles; neutral (pH 7.0); clear wavy boundary.

Bw2—11 to 15 inches; yellowish brown (10YR 5/4) extremely gravelly loam, dark yellowish brown (10YR 4/4) moist; weak medium and fine subangular blocky structure; slightly hard, friable,

slightly sticky and slightly plastic; few fine and common very fine roots; few fine and very fine tubular pores; about 60 percent gravel and 15 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

R—15 inches; fractured, hard schist; very few fine roots in cracks.

The depth to bedrock ranges from 10 to 20 inches. The content of rock fragments in the control section averages 55 to 80 percent. The rock fragments are mostly gravel. Reaction is slightly acid or neutral throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 6. When moist, it has hue of 7.5YR or 10YR, value of 3, and chroma of 2 to 4. This horizon is very gravelly loam or gravelly loam. It contains 15 to 25 percent clay.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. When moist, it has hue of 7.5YR or 10YR and value and chroma of 3 or 4. This horizon is extremely gravelly loam or very gravelly loam. It contains 14 to 27 percent clay and 45 to 80 percent gravel and cobbles.

## Demogul Series

The Demogul series consists of very deep, well drained soils on mountains. These soils formed in colluvium weathered from mica schist. Slopes range from 15 to 90 percent. Mean annual precipitation is 30 to 50 inches. Mean annual air temperature is about 54 degrees F.

These soils are fine-loamy, oxidic, mesic Ultic Palexeralfs.

Typical pedon of Demogul gravelly loam, in an area of Dougcity-Demogul complex, 50 to 75 percent slopes; about 1 mile southwest of Weaverville; 1,500 feet east and 950 feet south of the northwest corner of sec. 13, T. 33 N., R. 10 W., Weaverville quadrangle.

About 5 percent of the surface is covered with gravel.

Oi—2 inches to 0; needles, twigs, and leaves.

A—0 to 4 inches; pink (5YR 7/3) gravelly loam, dark brown (7.5YR 3/4) moist; moderate very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common coarse, medium, and fine roots and many very fine roots; few medium and common fine and very fine tubular pores; about 20 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

BA—4 to 9 inches; reddish yellow (7.5YR 6/6) gravelly clay loam, yellowish red (5YR 4/6) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few coarse and medium and common fine and very fine roots; few medium and common fine and very fine tubular pores; about 20 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt1—9 to 21 inches; reddish yellow (7.5YR 6/6) gravelly clay loam, yellowish red (5YR 5/6) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; few coarse and medium and common fine and very fine roots; few fine and common very fine tubular pores; few thin clay films lining pores and on faces of peds; about 20 percent gravel; strongly acid (pH 5.5); gradual wavy boundary.

Bt2—21 to 34 inches; reddish yellow (7.5YR 6/6) gravelly clay loam, yellowish red (5YR 5/6) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; few coarse and medium and common fine and very fine roots; few fine and common very fine tubular pores; common thin clay films lining pores and on faces of peds; about 20 percent gravel; strongly acid (pH 5.5); gradual wavy boundary.

Bt3—34 to 68 inches; red (2.5YR 5/6 and 4/8) gravelly clay loam, red (2.5YR 4/8) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; few medium and fine and common very fine roots; few very fine tubular pores; many thin clay films lining pores and on faces of peds; about 30 percent gravel; moderately acid (pH 6.0).

The content of clay in the particle-size control section ranges from 27 to 35 percent. The particle-size control section averages 20 to 30 percent rock fragments, mostly gravel. The extent of the surface covered with rock fragments ranges from 5 to 15 percent.

The A horizon has hue of 5YR or 7.5YR, value of 5 to 7, and chroma of 3 or 4. When moist, it has hue of 5YR to 10YR, value of 3 or 4, and chroma of 4. This horizon is slightly acid or neutral.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8. When moist, it has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 6 to 8. This horizon is mainly gravelly clay loam or gravelly sandy clay loam, but in some pedons it is very gravelly clay loam or very gravelly sandy clay loam in the lower part. It is strongly acid to slightly acid.

## Dougcity Series

The Dougcity series consists of very deep, well drained soils on mountains. These soils formed in colluvium weathered from mica schist. Slopes range from 15 to 75 percent. Mean annual precipitation is 30

to 60 inches. Mean annual air temperature is about 51 degrees F.

These soils are loamy-skeletal, oxidic, mesic Ultic Palexeralfs.

Typical pedon of Dougcity gravelly loam, in an area of Brownscreek-Dougcity complex, 30 to 50 percent slopes; about 3 miles south of Douglas City; 2,000 feet east and 1,200 feet north of the southwest corner of sec. 24, T. 32 N., R. 10 W., Hoosimbim Mountain quadrangle.

About 10 percent of the surface is covered with gravel.

Oi—1 inch to 0; leaves, needles, and twigs.

A—0 to 4 inches; yellowish brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate fine and very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine and medium and many very fine roots; common very fine tubular pores; about 20 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

AB—4 to 13 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium, fine, and very fine roots; common fine and very fine tubular pores; about 25 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.

Bt1—13 to 28 inches; reddish yellow (5YR 6/6) very gravelly loam, yellowish red (5YR 4/6) moist; strong medium and fine subangular blocky structure; hard, friable, sticky and plastic; few coarse and common medium, fine, and very fine roots; common fine and very fine tubular pores; few thin clay films lining pores and bridging mineral grains; about 40 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—28 to 39 inches; reddish yellow (5YR 6/6) very gravelly loam, yellowish red (5YR 4/6) moist; strong medium and fine subangular blocky structure; very hard, firm, very sticky and plastic; few coarse and common medium, fine, and very fine roots; few fine and common very fine tubular pores; many thin clay films lining pores and on faces of peds; about 50 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt3—39 to 57 inches; yellowish red (5YR 5/6) very gravelly clay loam, red (2.5YR 5/6) moist; moderate fine subangular blocky structure; very hard, firm, very sticky and very plastic; few fine and common very fine roots; few fine and common very fine tubular pores; many thin clay films lining pores and on faces of peds; about 55 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt4—57 to 80 inches; yellowish red (5YR 5/6) very gravelly clay loam, red (2.5YR 4/6) moist; moderate fine subangular blocky structure; very hard, firm, very sticky and very plastic; few fine and common very fine roots; few fine and common very fine tubular pores; many thin clay films lining pores and on faces of peds; about 55 percent gravel; slightly acid (pH 6.5).

The particle-size control section averages 25 to 35 percent clay and 35 to 50 percent rock fragments.

The A horizon has hue of 5YR to 10YR, value of 4 to 7, and chroma of 4 to 6. When moist, it has hue of 5YR to 10YR, value of 3 to 5, and chroma of 4 to 6. This horizon is slightly acid or neutral.

The Bt horizon has hue of 5YR or 7.5YR, value of 4 to 7, and chroma of 4 to 8. When moist, it has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. This horizon is moderately acid to neutral.

## Dubakella Series

The Dubakella series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from serpentinic and other ultrabasic rocks. Slopes range from 15 to 75 percent. Mean annual precipitation is 30 to 60 inches. Mean annual air temperature is about 47 degrees F.

These soils are clayey-skeletal, serpentinitic, mesic Mollic Haploxeralfs.

Typical pedon of Dubakella cobbly clay loam, 30 to 50 percent slopes; about 3¾ miles northwest of Hoosimbim Mountain; 2,000 feet west and 1,900 feet north of the southeast corner of sec. 20, T. 32 N., R. 10 W., Hayfork Summit quadrangle.

About 15 percent of the surface is covered with cobbles, and 10 percent is covered with gravel.

Oi—1 inch to 0; needles, twigs, cones, and branches.

A—0 to 5 inches; reddish brown (5YR 4/4) cobbly clay loam, dark reddish brown (5YR 3/3) moist; moderate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium, fine, and very fine roots; common fine and very fine tubular pores; about 10 percent cobbles and 15 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt1—5 to 11 inches; yellowish red (5YR 4/6) very cobbly clay loam, dark reddish brown (5YR 3/4) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; few coarse roots and common medium, fine, and very fine roots; common fine and very fine tubular pores; few thin clay films lining pores and on faces of

peds; about 20 percent cobbles and 20 percent gravel; mildly alkaline (pH 7.5); gradual wavy boundary.

Bt2—11 to 19 inches; yellowish red (5YR 4/6) very cobbly clay loam, dark reddish brown (5YR 3/4) moist; moderate medium and fine subangular blocky structure; very hard, friable, very sticky and very plastic; common coarse, medium, fine, and very fine roots; common fine and very fine tubular pores; common thin clay films lining pores and on faces of peds; about 25 percent cobbles and 20 percent gravel; mildly alkaline (pH 7.5); gradual wavy boundary.

BCt—19 to 34 inches; strong brown and yellowish red (7.5YR 5/8, 5YR 4/6) very cobbly clay, dark brown (7.5YR 4/4) moist; massive; very hard, friable, very sticky and very plastic; few medium, fine, and very fine roots; few fine and common very fine tubular pores; common thin clay films lining pores; about 25 percent cobbles and 25 percent gravel; few fine black manganese stains; mildly alkaline (pH 7.5); clear wavy boundary.

R—34 inches; fractured serpentinitic ultrabasic rock; clay films lining fractures.

The depth to serpentinitic ultrabasic rock is 20 to 40 inches. Reaction is neutral or mildly alkaline throughout the profile.

The A horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. When moist, it has hue of 5YR or 7.5YR, value of 3, and chroma of 2 to 4. This horizon is cobbly clay loam or stony loam.

The Bt horizon has hue of 5YR or 7.5YR and value and chroma of 3 to 6. When moist, it has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. This horizon is very cobbly clay loam or very cobbly clay. It contains 30 to 50 percent clay, but the average is 35 to 50 percent. The content of rock fragments in this horizon ranges from 35 to 75 percent.

## Etsel Series

The Etsel series consists of shallow, somewhat excessively drained soils on mountains. These soils formed in material weathered from sedimentary rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is 30 to 60 inches. Mean annual air temperature is about 54 degrees F.

These soils are loamy-skeletal, mixed, nonacid, mesic Lithic Xerorthents.

Typical pedon of Etsel very gravelly loam, in an area of Etsel-Bamtush complex, 50 to 75 percent slopes; about 2.5 miles northeast of Lewiston; 1,100 feet east and 300 feet south of the northwest corner of sec. 15, T. 33 N., R. 8 W., Lewiston quadrangle.

About 75 percent of the surface is covered with gravel.

Oi—2 inches to 0; leaves and twigs mixed with colluvial gravel.

A—0 to 4 inches; brown (7.5YR 5/2) very gravelly loam, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; common fine and very fine tubular pores; about 50 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

C1—4 to 8 inches; light brown (7.5YR 6/4) very gravelly loam, brown (7.5YR 4/4) moist; weak medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; few fine and very fine tubular pores; about 45 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

C2—8 to 14 inches; pink (7.5YR 7/4) very gravelly loam, strong brown (7.5YR 4/6) moist; weak medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; few fine and very fine tubular pores; about 50 percent gravel; strongly acid (pH 5.5); abrupt wavy boundary.

R—14 inches; fractured shale occurring as plates 3 inches thick that separate into fragments 1 to 3 inches wide and are oriented along the original bedding planes.

The depth to bedrock ranges from 14 to 20 inches.

The A horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 2 to 4. When moist, it has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4.

The C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 2 to 4. When moist, it has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 3 to 6.

The Etsel soils in this survey area have bedrock at a lower depth than is defined as the range for the series. Also, the Etsel soil in map unit 144 contains more serpentinitic minerals in the control section than is typical. These differences, however, do not affect the use or management of the soils.

## Goulding Series

The Goulding series consists of shallow, somewhat excessively drained soils on mountains. These soils formed in residuum and colluvium derived from metavolcanic or metasedimentary rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is about 45 inches. Mean annual air temperature is about 55 degrees F.

These soils are loamy-skeletal, mixed, mesic Lithic Xerochrepts.

Typical pedon of Goulding very gravelly loam, in an area of Goulding-Vitzthum-Vanvor complex, 50 to 75 percent slopes; about 5 miles southeast of Hoosimbim Mountain; 1,300 feet west and 400 feet north of the southeast corner of sec. 8, T. 31 N., R. 9 W., Hoosimbim Mountain quadrangle.

About 20 percent of the surface is covered with gravel.

Oi—½ inch to 0; leaves and a few twigs and grass stems.

A—0 to 6 inches; brown (10YR 4/3) very gravelly loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine, very fine, and coarse roots; common fine and medium tubular pores; about 50 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt—6 to 13 inches; dark yellowish brown (10YR 4/4) extremely gravelly loam, dark yellowish brown (10YR 3/4) moist; moderate medium and fine granular structure, mostly near roots; soft, very friable, slightly sticky and slightly plastic; many fine and very fine and common coarse roots; common fine and medium tubular pores; common thin clay films on rock faces; about 65 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); abrupt irregular boundary.

R—13 inches; fractured rock; few narrow fractures; few roots.

The depth to bedrock ranges from 10 to 20 inches. The control section averages 35 to 80 percent rock fragments, mostly gravel.

The A horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4. When moist, it has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. This horizon is slightly acid to strongly acid.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. When moist, it has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. This horizon is extremely gravelly loam or very gravelly loam. It is slightly acid to strongly acid.

## Haploxerolls

Haploxerolls consist of very deep, well drained soils on alluvial fans and stream terraces. These soils formed in alluvium derived from mixed rock sources and colluvium from granitic rock sources. Slopes range from 0 to 9 percent.

Reference pedon of Haploxerolls, 2 to 9 percent slopes; about 2 miles southeast of Lewiston; 0.2 mile east of Trinity Dam Boulevard up Phillips Gulch; 1,600 feet east and 900 feet north of the southwest corner of sec. 29, T. 33 N., R. 8 W., Lewiston quadrangle.

Oi—2 inches to 0; needles, leaves, and twigs.

A1—0 to 2 inches; grayish brown (10YR 5/2) fine gravelly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse and medium granular structure; slightly hard, friable, nonsticky and nonplastic; few fine and very fine roots; common fine and very fine tubular pores and many fine and very fine interstitial pores; about 30 percent fine gravel; slightly acid (pH 6.5); clear smooth boundary.

A2—2 to 10 inches; grayish brown (10YR 5/2) fine gravelly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common medium, fine, and very fine roots; common fine and very fine tubular pores and many fine and very fine interstitial pores; about 30 percent fine gravel; moderately acid (pH 6.0); gradual smooth boundary.

C1—10 to 38 inches; light brownish gray (10YR 6/2) fine gravelly coarse sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; common coarse, medium, fine, and very fine roots; common fine and very fine tubular and interstitial pores; about 20 percent fine gravel; slightly acid (pH 6.5); clear wavy boundary.

C2—38 to 44 inches; light brownish gray (10YR 6/2) fine gravelly coarse sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few coarse, medium, fine, and very fine roots; common fine and very fine tubular pores and many fine and very fine interstitial pores; about 30 percent fine gravel; slightly acid (pH 6.5); clear smooth boundary.

2Ab—44 to 60 inches; dark grayish brown (10YR 4/2) fine gravelly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few coarse, medium, fine, and very fine roots; common fine and very fine tubular pores and many fine and very fine interstitial pores; about 30 percent fine gravel; slightly acid (pH 6.5).

Reaction is slightly acid or moderately acid throughout. The thickness of the mollic epipedon ranges from 10 to 25 inches. Colors and textures are variable. Textures include fine gravelly coarse sandy loam, coarse sandy loam, fine sandy loam, loamy fine sand, and coarse sand. The gravelly, fine gravelly, or extremely cobbly analogs of these textures may also be included.

## Haysum Series

The Haysum series consists of very deep, well drained soils on stream terraces and alluvial fans. These soils formed in alluvium derived from mixed rock sources. Slopes range from 0 to 9 percent. Mean annual precipitation is 30 to 40 inches. Mean annual air temperature is about 54 degrees F.

These soils are fine-loamy, mixed, mesic Pachic Argixerolls.

Typical pedon of Haysum gravelly loam, 0 to 2 percent slopes; 5.5 miles northeast of Hayfork; 100 feet east and 300 feet north of the southwest corner of sec. 35, T. 32 N., R. 11 W., Hayfork Summit quadrangle.

A1—0 to 5 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; strong medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and many very fine roots; many fine and very fine tubular pores; about 30 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

A2—5 to 15 inches; yellowish brown (10YR 5/4) gravelly loam, dark brown (10YR 3/3) moist; weak medium, fine, and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; few fine and common very fine tubular pores; about 20 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt1—15 to 27 inches; yellowish brown (10YR 5/4) gravelly clay loam, dark brown (10YR 3/3) moist; moderate medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few coarse and medium and common fine and very fine roots; few medium, common fine, and many very fine tubular pores; common thin clay films lining pores and on faces of peds; about 20 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—27 to 48 inches; yellowish brown (10YR 5/4) gravelly clay loam, brown (10YR 4/3) moist; weak medium and fine subangular blocky structure; very hard, firm, sticky and plastic; few medium and common fine and very fine roots; few very fine tubular pores; common thin clay films lining pores and on faces of peds; about 25 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt3—48 to 66 inches; yellowish brown (10YR 5/4) gravelly clay loam, dark yellowish brown (10YR 4/4) moist; weak medium and fine subangular blocky structure; very hard, firm, sticky and plastic; few fine and very fine roots; few very fine tubular pores; common thin clay films lining pores and on faces of peds; about 30 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt4—66 to 71 inches; yellowish brown (10YR 5/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; few thin clay films lining pores and on faces of peds; about 55 percent gravel; slightly acid (pH 6.5).

The particle-size control section averages 15 to 35 percent rock fragments and 27 to 35 percent clay. The thickness of the mollic epipedon ranges from 20 to 40 inches.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 3 or 4. When moist, it has hue of 10YR, value of 3, and chroma of 2 or 3. This horizon is loam or gravelly loam. It contains 20 to 27 percent clay and 5 to 35 percent gravel. It is slightly acid or neutral.

The Bt horizon has hue of 10YR, value of 3 to 5, and chroma of 3 or 4. When moist, it has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. This horizon is clay loam, gravelly clay loam, gravelly loam, very gravelly sandy clay loam, or very gravelly clay loam. It contains 15 to 35 percent rock fragments in the upper part and may contain as much as 65 percent rock fragments in the lower part. It contains 25 to 35 percent clay.

The Haysum soil in map unit 152 is a taxadjunct because it has a lighter colored surface layer than is defined as the range for the series. This difference, however, does not affect the use or management of the soil.

## Holkat Series

The Holkat series consists of moderately deep, well drained soils on mountains. These soils formed in colluvium and material weathered from metasedimentary rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is 35 to 65 inches. Mean annual air temperature is about 47 degrees F.

These soils are fine-loamy, mixed, mesic Dystric Xerochrepts.

Typical pedon of Holkat loam, in an area of Holkat-Hoosimbim complex, 50 to 75 percent slopes; about 4.5 miles southwest of Lewiston; 600 feet east and 250 feet south of the northwest corner of sec. 12, T. 32 N., R. 9 W., Lewiston quadrangle.

About 15 percent of the surface is covered with gravel.

A—0 to 3 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak fine and very fine granular structure; slightly hard, friable, slightly sticky and

slightly plastic; common fine and very fine roots; common fine and many very fine tubular pores; about 5 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt—3 to 10 inches; light yellowish brown (10YR 6/4) gravelly loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium and common very fine roots; common very fine tubular pores; few thin clay films lining pores and on faces of peds; about 15 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

C1—10 to 22 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; about 20 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

C2—22 to 35 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; about 25 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Cr—35 to 37 inches; saprolitic metasedimentary rock; no roots.

The combined thickness of the A and Bt horizons ranges from 10 to 20 inches. The depth to weathered bedrock ranges from 20 to 40 inches. The particle-size control section contains 10 to 30 percent gravel and 23 to 26 percent clay. Reaction is slightly acid or moderately acid throughout the profile.

The A horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. When moist, it has hue of 10YR, value of 3, and chroma of 2 or 3.

The Bt horizon has hue of 7.5YR or 10YR, value of 6 or 7, and chroma of 2 to 4. It is loam or gravelly loam.

## Holkat Variant

The Holkat Variant consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from metavolcanic or metasedimentary rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is 30 to 60 inches. Mean annual air temperature is about 53 degrees F.

These soils are fine-loamy, mixed, mesic Typic Xerochrepts.

Typical pedon of Holkat Variant gravelly loam, in an area of Holkat Variant-Dedrick association, 50 to 75 percent slopes; about 4.5 miles east of Helena; 1,100 feet east and 400 feet south of the northwest corner of sec. 31, T. 34 N., R. 10 W., Dedrick quadrangle.

Oi—1 inch to 0; leaves and twigs.

A—0 to 5 inches; brown (7.5YR 4/4) gravelly loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure parting to moderate very fine subangular blocky; soft, very friable, slightly sticky and slightly plastic; few medium and fine and many very fine roots; common fine and very fine tubular pores; about 15 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

BA—5 to 12 inches; strong brown (7.5YR 4/6) gravelly loam, dark brown (7.5YR 3/4) moist; moderate fine and very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common fine and very fine tubular pores; about 15 percent gravel; neutral (pH 7.0); gradual wavy boundary.

Bt1—12 to 23 inches; strong brown (7.5YR 4/6) gravelly loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure parting to strong very fine subangular blocky; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common fine and very fine tubular pores; few thin clay films lining pores; about 20 percent gravel and 10 percent soft, weathered gravel; neutral (pH 7.0); gradual wavy boundary.

Bt2—23 to 35 inches; strong brown (7.5YR 4/6) gravelly loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure parting to strong very fine subangular blocky; soft, very friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots and common very fine roots; few fine and common very fine tubular pores; few thin clay films lining pores; about 30 percent gravel and 10 percent soft, weathered gravel; neutral (pH 7.0); clear wavy boundary.

Bt3—35 to 38 inches; strong brown (7.5YR 4/6) very gravelly loam, brown (7.5YR 4/4) moist; weak fine and very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few fine and very fine roots; few fine and very fine tubular pores; about 45 percent gravel, 15 percent soft, weathered gravel, and 10 percent cobbles; neutral (pH 6.6); abrupt wavy boundary.

R—38 inches; fractured schist; roots in some cracks.

The soil temperature is 54 to 59 degrees F. The depth to bedrock ranges from 20 to 40 inches. The control section averages 15 to 25 percent rock fragments.

The A horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 6. When moist, it has hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 6. This

horizon is slightly acid or neutral. It is gravelly loam or clay loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. When moist, it has hue of 5YR to 10YR, value of 3 or 4, and chroma of 3 to 6. This horizon is gravelly loam, gravelly clay loam, very gravelly clay loam, or very gravelly loam. The very gravelly clay loam or very gravelly loam is in the lower part of the horizon.

## Hoosimbim Series

The Hoosimbim series consists of deep, well drained soils on mountains. These soils formed in residuum and colluvium derived from metavolcanic or metasedimentary rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is 35 to 65 inches. Mean annual air temperature is about 50 degrees F.

These soils are loamy-skeletal, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Hoosimbim extremely gravelly sandy loam, in an area of Marpa-Hoosimbim-Bamtush complex, 50 to 75 percent slopes; about 3.5 miles north of Hoosimbim Mountain; 1,250 feet east and 1,700 feet north of the southwest corner of sec. 22, T. 32 N., R. 10 W., Hoosimbim Mountain quadrangle.

About 50 percent of the surface is covered with angular gravel.

Oi—2 inches to 0; leaves, needles, and twigs more decomposed with depth and mixed with gravel.

A—0 to 4 inches; yellowish brown (10YR 5/4) extremely gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; strong very fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common medium and fine and many very fine roots; common fine and very fine tubular pores; about 65 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

BA—4 to 10 inches; brown (7.5YR 5/4) very gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; moderate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots and few coarse roots; common fine and very fine tubular pores; about 50 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt1—10 to 16 inches; light brown (7.5YR 6/4) very gravelly sandy clay loam, strong brown (7.5YR 4/6) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine and few medium and coarse roots; few fine and common very fine tubular pores; few thin clay films lining pores and on faces of peds; about 55 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—16 to 28 inches; reddish yellow (7.5YR 6/6) extremely gravelly sandy clay loam, strong brown (7.5YR 4/6) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine and few medium and coarse roots; few fine and common very fine tubular pores; common thin clay films lining pores and on faces of peds; about 65 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.

Bt3—28 to 42 inches; reddish yellow (5YR 6/6) extremely gravelly sandy clay loam, yellowish red (5YR 4/6) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium and common very fine roots; few fine and common very fine tubular pores; many thin clay films lining pores and on faces of peds; about 65 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); abrupt wavy boundary.

R—42 inches; fractured metavolcanic rock; clay films lining fractures.

The depth to bedrock ranges from 40 to 60 inches.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. When moist, it has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. This horizon is extremely gravelly sandy loam or gravelly loam. It contains 15 to 25 percent clay. It ranges from neutral to moderately acid.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 7, and chroma of 4 to 6. When moist, it has hue of 5YR to 10YR, value of 3 to 5, and chroma of 4 to 8. This horizon is extremely gravelly sandy clay loam, very gravelly clay loam, or very gravelly sandy clay loam. It contains 25 to 35 percent clay and 45 to 85 percent rock fragments. It ranges from slightly acid to strongly acid.

The Hoosimbim soil in map unit 156 is outside the range for the series because it is underlain by soft, weathered, weakly consolidated conglomerate and is on hills. These differences, however, do not affect the use or management of the soil.

## Hotaw Series

The Hotaw series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from granitic rocks. Slopes range from 15 to 50 percent. Mean annual precipitation is 30 to 50 inches. Mean annual air temperature is about 54 degrees F.

These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Hotaw loam, 15 to 30 percent slopes; about 1 mile south of Lewiston; 300 feet east of the northwest corner of sec. 29, T. 33 N., R. 8 W., Lewiston quadrangle.

Oi—½ inch to 0; moss-covered grass stems and some leaves.
A—0 to 4 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 3/3) moist; strong fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine and few medium roots; common fine and very fine tubular pores; neutral (pH 7.0); clear wavy boundary.
BA—4 to 6 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common medium, fine, and very fine roots and few coarse roots; few fine and very fine tubular pores; moderately acid (pH 6.0); gradual wavy boundary.
Bt1—6 to 12 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; few fine and very fine tubular pores; few thin clay films lining pores; about 5 percent fine gravel; strongly acid (pH 5.5); gradual wavy boundary.
Bt2—12 to 22 inches; light yellowish brown and yellowish brown (10YR 6/4 and 5/6) clay loam, dark yellowish brown (10YR 3/6) moist; strong coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; few very fine tubular pores; common thin clay films lining pores; about 5 percent fine gravel; moderately acid (pH 6.0); gradual wavy boundary.
BCt1—22 to 30 inches; very pale brown and strong brown (10YR 7/4, 7.5YR 5/6) clay loam, dark yellowish brown (10YR 4/4) moist; massive; very hard, firm, slightly sticky and slightly plastic; few coarse and medium and common fine and very fine roots; few very fine tubular pores; many thin clay films lining pores; about 5 percent fine gravel; strongly acid (pH 5.5); gradual wavy boundary.
BCt2—30 to 37 inches; very pale brown and strong brown (10YR 7/4, 7.5YR 5/6) clay loam, dark yellowish brown (10YR 4/4) moist; massive; very hard, firm, slightly sticky and slightly plastic; few fine and very fine roots; few very fine tubular pores; many thin clay films lining pores; about 5 percent fine gravel; slightly acid (pH 6.5); clear wavy boundary.
Crt—37 inches; dense, very firm, weathered granitic rock; clay films lining pores; can be dug with difficulty.

The A horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 4. When moist, it has hue of 10YR, value of 3, and chroma of 3 or 4.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. When moist, it has hue of 10YR, value of 3 to 5, and chroma of 3 to 6.

The Hotaw soils in this survey area are dry for shorter periods in the summer than are defined as the range for the series. This difference, however, does not affect the use or management of the soils.

## Indleton Series

The Indleton series consists of very deep, well drained soils on mountains. These soils formed in residuum and colluvium derived from metasedimentary rocks. Slopes range from 50 to 75 percent. Mean annual precipitation is 30 to 60 inches. Mean annual air temperature is about 48 degrees F.

These soils are loamy-skeletal, mixed, mesic Typic Xerochrepts.

Typical pedon of Indleton extremely gravelly sandy loam, in an area of Indleton-Caris-Hoosimbim complex, 50 to 75 percent slopes; 3 miles northwest of Hoosimbim Mountain; 400 feet west and 100 feet south of the northeast corner of sec. 29, T. 32 N., R. 10 W., Hayfork Summit quadrangle.

About 45 percent of the surface is partially covered with gravel.

Oi—1 inch to 0; needles, twigs, leaves, branches, and cones.
A1—0 to 5 inches; grayish brown (10YR 5/2) extremely gravelly sandy loam, dark brown (10YR 3/3) moist; weak very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine and many very fine roots; common fine and very fine interstitial pores; about 65 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.
A2—5 to 11 inches; pale brown (10YR 6/3) extremely gravelly sandy loam, brown (10YR 4/3) moist; moderate very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common coarse, medium, and fine roots and many very fine roots; common fine and very fine interstitial pores; about 70 percent gravel; slightly acid (pH 6.5); clear wavy boundary.
Bt1—11 to 22 inches; pale brown (10YR 6/3) extremely gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky

structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; common fine and very fine tubular pores; few thin clay films lining pores and occurring as bridges; about 65 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

Bt2—22 to 39 inches; pale brown (10YR 6/3) extremely gravelly sandy clay loam, yellowish brown (10YR 5/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium, fine, and very fine roots; common fine and very fine tubular pores; few thin clay films lining pores and occurring as bridges; about 65 percent gravel and 10 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

BCt—39 to 60 inches; pale brown (10YR 6/3) extremely gravelly sandy loam, yellowish brown (10YR 5/6) moist; weak very fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few medium and common fine and very fine roots; few fine and very fine tubular pores; few thin clay films lining pores and occurring as bridges; about 65 percent gravel and 10 percent cobbles; moderately acid (pH 6.0).

Reaction is slightly acid or moderately acid.

The A horizon has hue of 10YR, value of 4 to 7, and chroma of 2 to 4. When moist, it has hue of 10YR and value and chroma of 3 or 4.

The Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 2 to 4. When moist, it has hue of 10YR, value of 4 or 5, and chroma of 4 to 8. This horizon is extremely gravelly sandy loam, extremely gravelly sandy clay loam, very gravelly loam, or extremely gravelly loam.

## Jafa Series

The Jafa series consists of very deep, well drained soils on terraces and hills. These soils formed in alluvium derived from mixed rock sources. Slopes range from 0 to 30 percent. Mean annual precipitation is 30 to 40 inches. Mean annual air temperature is about 54 degrees F.

These soils are fine-loamy, mixed, mesic Ultic Palexeralfs.

Typical pedon of Jafa loam, 0 to 5 percent slopes; about 2.5 miles northeast of Hayfork; 0.85 mile north of Highway 3 on Big Creek Road, 300 feet east of the road; 250 feet east and 1,900 feet north of the southwest corner of sec. 5, T. 31 N., R. 11 W., Hayfork quadrangle.

Scattered leaves are on the surface.

A1—0 to 2 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine and very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores and many fine and very fine interstitial pores; about 5 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

A2—2 to 6 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; moderate medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common medium and coarse and many fine and very fine roots; many very fine tubular pores; about 5 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

BA—6 to 14 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak fine and very fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few medium and common fine and very fine roots; many very fine tubular pores; very few thin clay films; about 10 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt1—14 to 26 inches; strong brown (7.5YR 5/6) gravelly clay loam, strong brown (7.5YR 4/6) moist; moderate medium and fine subangular blocky structure; very hard, firm, sticky and plastic; few fine and very fine roots; common very fine tubular pores; many thin clay films lining pores and on faces of peds; common very fine black masses; about 15 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

Bt2—26 to 44 inches; strong brown (7.5YR 5/6) gravelly clay loam, strong brown (7.5YR 4/6) moist; moderate medium and fine subangular blocky structure; very hard, firm, very sticky and very plastic; few fine and very fine roots; common very fine tubular pores; many clay films lining pores and on faces of peds; common very fine black manganese masses; about 20 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.

Bt3—44 to 67 inches; strong brown (7.5YR 5/6) gravelly clay loam, strong brown (7.5YR 4/6) moist; moderate medium and fine subangular blocky structure; very hard, firm, very sticky and very plastic; few fine and very fine roots; common very fine tubular pores; common thin clay films lining pores and on faces of peds; common very fine black masses; about 25 percent gravel; moderately acid (pH 6.0).

The control section averages 10 to 25 percent rock fragments.

The A horizon has hue of 10YR, value of 4 or 5, and

chroma of 3 or 4. When moist, it has hue of 7.5YR or 10YR, value of 3, and chroma of 3 or 4. This horizon is slightly acid or neutral.

The Bt horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. When moist, it has hue of 5YR or 7.5YR, value of 4, and chroma of 4 to 6. This horizon is gravelly clay loam, clay loam, or gravelly sandy clay loam. In some pedons it has layers of very gravelly clay loam. The horizon contains mainly 5 to 25 percent gravel and 0 to 5 percent cobbles, but a few thin horizons contain as much as 40 percent gravel. The Bt horizon mainly contains 25 to 35 percent clay. In some pedons it has more than 40 percent clay below a depth of 40 inches. This horizon is moderately acid or slightly acid.

## Marpa Series

The Marpa series consists of moderately deep, well drained soils on mountains. These soils formed in residuum and colluvium derived from metavolcanic, metasedimentary, and sedimentary rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is 40 to 60 inches. Mean annual air temperature is about 50 degrees F.

These soils are loamy-skeletal, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Marpa very gravelly sandy clay loam, in an area of Marpa-Hoosimbim-Bamtush complex, 50 to 75 percent slopes; 2.5 miles northeast of Hoosimbim Mountain; 600 feet west and 1,800 feet north of the southeast corner of sec. 27, T. 32 N., R. 10 W., Hoosimbim Mountain quadrangle.

About 60 percent of the surface is covered with gravel.

A—0 to 3 inches; brown (7.5YR 5/4) very gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; moderate fine and very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine and very fine tubular pores; about 45 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt1—3 to 10 inches; brown (7.5YR 5/4) very gravelly clay loam, dark brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and coarse and common fine and very fine roots; few medium and common fine and very fine tubular pores; few thin clay films lining pores and occurring as bridges; about 40 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—10 to 19 inches; strong brown (7.5YR 5/6) very gravelly clay loam, strong brown (7.5YR 4/6) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, sticky and slightly plastic; few coarse and common medium, fine, and very fine roots; common fine and very fine tubular pores; common thin clay films lining pores and occurring as bridges; about 50 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt3—19 to 31 inches; strong brown (7.5YR 5/6) extremely gravelly clay loam, strong brown (7.5YR 4/6) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; few fine and very fine tubular pores; common thin clay films lining pores; about 70 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

R—31 inches; fractured metamorphic rock; roots extending into some fractures; clay films lining fractures.

The depth to bedrock ranges from 20 to 40 inches. The particle-size control section averages 27 to 35 percent clay.

The A horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4. When moist, it has hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 4. This horizon is slightly acid or neutral.

The Bt horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. When moist, it has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 4 to 6. This horizon is very gravelly clay loam, extremely gravelly clay loam, extremely gravelly sandy clay loam, or very gravelly sandy clay loam. It contains 35 to 80 percent rock fragments.

The Marpa soils in this survey area have slightly higher soil reaction than is defined as the range for the series. This difference, however, does not significantly affect the use or management of the soils.

## Marpa Variant

The Marpa Variant consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from metasedimentary rocks. Slopes range from 15 to 75 percent. Mean annual precipitation is 40 to 60 inches. Mean annual air temperature is about 53 degrees F.

These soils are clayey-skeletal, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Marpa Variant gravelly clay loam, in an area of Goulding-Holkat Variant-Marpa Variant complex, 50 to 75 percent slopes; about 2.5 miles south of Lewiston; 0.3 mile east of the entrance to Fawn

Lodge off Highway 299; 200 feet east and 1,600 feet south of the northwest corner of sec. 31, T. 33 N., R. 8 W., Lewiston quadrangle.

Oi—½ inch to 0; needles, leaves, twigs, and limbs.
A—0 to 10 inches; light brownish gray (10YR 6/2) gravelly clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; few fine and medium and common very fine tubular pores; about 20 percent gravel; strongly acid (pH 5.5); clear wavy boundary.
Bt1—10 to 19 inches; brown (7.5YR 5/4) very cobbly clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; few medium and common fine and very fine tubular pores; continuous thin clay films lining pores and on faces of peds; about 30 percent cobbles and 20 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.
Bt2—19 to 36 inches; light reddish brown (5YR 6/4) very cobbly clay, reddish brown (5YR 4/4) moist; moderate medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; few very fine, fine, medium, and coarse tubular pores; continuous thin clay films lining pores and on faces of peds; about 30 percent cobbles and 20 percent gravel; moderately acid (pH 6.0).
R—36 inches; fractured metamorphosed shale.

The depth to bedrock ranges from 20 to 40 inches. The particle-size control section averages 35 to 40 percent clay.

The A horizon has hue of 7.5YR or 10YR, value of 6 or 7, and chroma of 2 to 4. When moist, it has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4.

The Bt horizon has hue of 5YR or 7.5YR, value of 5 to 7, and chroma of 4 to 6. When moist, it has hue of 5YR to 10YR, value of 4, and chroma of 3 to 6. This horizon is very cobbly clay loam, very cobbly clay, very gravelly clay loam, or very gravelly clay.

## Millsholm Series

The Millsholm series consists of shallow, well drained soils on hills. These soils formed in material weathered from mudstone. Slopes range from 5 to 30 percent. Mean annual precipitation is 40 to 50 inches. Mean annual air temperature is about 60 degrees F.

These soils are loamy, mixed, thermic Lithic Xerochrepts.

Typical pedon of Millsholm loam, 5 to 9 percent slopes; about 4 miles southeast of Douglas City; 2,400 feet west of the southeast corner of sec. 29, T. 32 N., R. 9 W., Hoosimbim Mountain quadrangle.

About 10 percent of the surface is covered with gravel.

A—0 to 3 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few fine and common very fine tubular pores; about 5 percent gravel; slightly acid (pH 6.5); clear wavy boundary.
Bw—3 to 11 inches; light yellowish brown (10YR 6/4) loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; about 5 percent gravel; slightly acid (pH 6.5); clear wavy boundary.
R—11 inches; fractured mudstone; fragments are ½ inch to 3 inches in diameter; no roots.

The depth to bedrock ranges from 10 to 20 inches.

The A horizon has hue of 10YR, value of 5 or 6, and chroma of 4. When moist, it has hue of 7.5YR or 10YR, value of 3, and chroma of 4.

The Bw horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4.

## Minersville Series

The Minersville series consists of deep, well drained soils on mountains. These soils formed in residuum and colluvium derived from granitic rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is 40 to 65 inches. Mean annual air temperature is about 48 degrees F.

These soils are coarse-loamy, mixed, mesic Typic Xerochrepts.

Typical pedon of Minersville sandy loam, in an area of Tallowbox-Minersville complex, 50 to 75 percent slopes; about 1 mile north of Buckhorn Summit; about 1.2 miles east of Buckhorn Highway Maintenance Station on Highway 299, on south side of drainageway, uphill 700 feet on east side of the road; 300 feet west and 1,600 feet south of the northeast corner of sec. 10, T. 32 N., R. 8 W., French Gulch quadrangle.

Oi—2 inches to 0; fresh and decayed needles, twigs, cones, and branches.
A—0 to 5 inches; pale brown (10YR 6/3) sandy loam, dark brown (10YR 3/3) moist; weak fine and very fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; few medium and common fine and very fine roots; common fine and

very fine tubular pores; about 10 percent fine gravel; moderately acid (pH 6.0); clear wavy boundary.

Bw1—5 to 17 inches; very pale brown (10YR 7/3) sandy loam, brown (10YR 5/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common medium, fine, and very fine roots; common fine and very fine tubular pores; few thin gray coatings lining pores; about 10 percent fine gravel; strongly acid (pH 5.5); gradual wavy boundary.

Bw2—17 to 30 inches; very pale brown (10YR 7/3) fine gravelly coarse sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few medium and fine and common very fine roots; few very fine tubular pores; about 20 percent fine gravel; strongly acid (pH 5.5); clear wavy boundary.

C—30 to 43 inches; light gray and very pale brown (10YR 7/2 and 7/3) very gravelly coarse sandy loam, brown and light yellowish brown (10YR 5/3 and 6/4) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; few very fine tubular pores; about 40 percent fine gravel; strongly acid (pH 5.5); gradual wavy boundary.

Cr—43 inches; soft, weathered, crumbly granitic rock.

The depth to weathered granitic rock ranges from 40 to 60 inches. The combined thickness of the A and Bw horizons ranges from 15 to 36 inches. The particle-size control section averages 15 to 30 percent fine gravel but has 10 to 55 percent fine gravel in any one horizon. Reaction is strongly acid to slightly acid throughout the profile.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 to 4. When moist, it has hue of 10YR, value of 3 or 4, and chroma of 1 to 3. This horizon contains 5 to 15 percent fine gravel.

The Bw horizon has hue of 10YR, value of 5 to 8, and chroma of 2 to 4. When moist, it has hue of 10YR, value of 3 to 6, and chroma of 2 to 4. This horizon is sandy loam, fine gravelly coarse sandy loam, or fine gravelly sandy loam. It contains 10 to 20 percent fine gravel and 10 to 17 percent clay.

The C horizon is very gravelly coarse sandy loam, fine gravelly coarse sandy loam, or fine gravelly sandy loam. It contains 25 to 55 percent fine gravel and 5 to 11 percent clay.

## Minersville Variant

The Minersville Variant consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from granitic rocks. Slopes range from 50 to 75 percent. Mean annual precipitation is 65 to 75 inches. Mean annual air temperature is about 44 degrees F.

These soils are sandy-skeletal, mixed, frigid Entic Xerumbrepts.

Typical pedon of Minersville Variant gravelly loamy coarse sand, in an area of Minersville Variant-Choop complex, 50 to 75 percent slopes; 0.25 mile northwest of Shoemaker Bally; in an unsectionalized area about 1,200 feet east and 1,600 feet south of the southeast corner of sec. 31, T. 32 N., R. 7 W., Shasta Bally quadrangle.

Oi—3 inches to 0; fir needles, twigs, limbs, and bark.

A1—0 to 9 inches; dark grayish brown (10YR 4/2) fine gravelly loamy coarse sand, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; common very fine and fine and few medium interstitial pores; about 30 percent fine gravel; moderately acid (pH 6.0); clear wavy boundary.

A2—9 to 18 inches; brown (10YR 4/3) very gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots; common very fine and fine and few medium interstitial pores; about 40 percent fine gravel; moderately acid (pH 6.0); clear wavy boundary.

C—18 to 34 inches; light brownish gray (2.5Y 6/2) very gravelly loamy coarse sand, dark grayish brown (2.5Y 4/2) moist; soft, very friable, nonsticky and nonplastic; common very fine roots and few fine, medium, and coarse roots; many very fine, fine, and medium interstitial pores; about 45 percent fine gravel; moderately acid (pH 6.0); clear wavy boundary.

Cr—34 inches; white, pale brown, gray, and black, soft, decomposed granitic rock.

The depth to paralithic contact ranges from 20 to 40 inches. The average content of clay ranges from 0 to 10 percent. The content of coarse and very coarse sand ranges from 40 to 60 percent. The content of fine gravel ranges from 35 to 50 percent. Reaction is strongly acid or moderately acid.

## Musserhill Series

The Musserhill series consists of moderately deep, well drained soils on hills. These soils formed in material weathered from weakly consolidated conglomerate. Slopes range from 9 to 50 percent. Mean annual precipitation is 30 to 40 inches. The mean annual air temperature is about 54 degrees F.

These soils are loamy-skeletal, oxidic, mesic Mollic Haploxeralfs.

Typical pedon of Musserhill gravelly loam, 30 to 50 percent slopes; about 2 miles east of Weaverville; 400 feet east and 2,500 feet south of the northwest corner of sec. 9, T. 33 N., R. 9 W., Weaverville quadrangle.

Oi—½ inch to 0; leaves, twigs, and grass stems.
A—0 to 5 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/4) moist; moderate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and coarse and common fine and very fine roots; few medium and fine and common very fine tubular pores; about 20 percent rounded gravel; neutral (pH 7.0); clear wavy boundary.
Bt1—5 to 11 inches; reddish brown (5YR 4/4) very gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; few medium and coarse and common fine and very fine roots; few medium and fine and common very fine tubular pores; few thin clay films lining pores and on faces of peds; about 35 percent rounded gravel and 5 percent rounded cobbles; slightly acid (pH 6.5); gradual wavy boundary.
Bt2—11 to 21 inches; reddish brown (5YR 5/4) extremely cobbly clay loam, reddish brown (5YR 4/4) moist; moderate medium and fine angular blocky structure; very hard, firm, sticky and plastic; common coarse, medium, fine, and very fine roots; common fine and very fine tubular pores; many thin clay films lining pores and on faces of peds; about 45 percent rounded gravel and 20 percent rounded cobbles; neutral (pH 7.0); clear wavy boundary.
Bt3—21 to 32 inches; reddish brown (5YR 5/4) extremely cobbly clay loam, yellowish red (5YR 4/6) moist; moderate medium and fine angular blocky structure; extremely hard, very firm, sticky and plastic; few coarse, medium, and fine roots and common very fine roots; common very fine tubular pores; many thin clay films lining pores and on faces of peds; about 50 percent rounded gravel and 20 percent rounded cobbles; neutral (pH 7.0); clear wavy boundary.
Crt—32 inches; weakly consolidated conglomerate with rounded gravel and cobbles; reddish brown matrix crushes to clay loam; clay films coating rock fragments and lining pores; very few roots in pockets.

The depth to paralithic contact ranges from 20 to 40 inches. Reaction is slightly acid or neutral throughout the profile. Base saturation ranges from 75 to 85 percent by sum of cations. The particle-size control section contains 35 to 75 percent rock fragments and 27 to 35 percent clay.

The A horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4. When moist, it has hue of 5YR to 10YR, value of 3, and chroma of 4.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 4 to 6. When moist, it has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6. This horizon is very gravelly clay loam, extremely cobbly clay loam, or extremely gravelly clay loam.

## Musserhill Variant

The Musserhill Variant consists of moderately deep, well drained soils on hills. These soils formed in material weathered from weakly consolidated conglomerate. Slopes range from 30 to 50 percent. Mean annual precipitation is 30 to 40 inches. Mean annual air temperature is about 59 degrees F.

These soils are clayey-skeletal, mixed, thermic Mollic Haploxeralfs.

Typical pedon of Musserhill Variant loam, 30 to 50 percent slopes; about 5.5 miles southeast of Douglas City; 1,000 feet west and 2,300 feet north of the southeast corner of sec. 27, T. 32 N., R. 9 W., Bully Choop Mountain quadrangle.

About 25 percent of the surface is covered with gravel.

Oi—½ inch to 0; leaves, twigs, and grass stems.
A—0 to 4 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 3/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and fine and common very fine roots; few fine and very fine tubular pores; about 10 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.
BA—4 to 9 inches; light yellowish brown (10YR 6/4) gravelly clay loam, dark brown (7.5YR 3/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and fine and common very fine roots; common fine and very fine tubular pores; about 15 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.
Bt1—9 to 13 inches; light yellowish brown (10YR 6/4) gravelly clay loam, dark brown (7.5YR 3/4) moist; strong fine subangular blocky structure; hard, firm, sticky and plastic; few coarse roots and common medium, fine, and very fine roots; common fine and very fine tubular pores; few thin clay films lining pores and on faces of peds; about 25 percent gravel; slightly acid (pH 6.5); clear wavy boundary.
Bt2—13 to 19 inches; strong brown and brown (7.5YR

4/6 and 5/4) very gravelly clay, strong brown (7.5YR 4/6) moist; strong medium angular blocky structure; extremely hard, extremely firm, very sticky and very plastic; common coarse, medium, fine, and very fine roots; common fine and very fine interstitial pores; many thin clay films lining pores and on faces of peds; about 35 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt3—19 to 32 inches; strong brown and brown (7.5YR 4/6 and 5/4) very gravelly clay, yellowish brown (10YR 5/6) moist; strong medium angular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few coarse and medium and common fine and very fine roots; common fine and very fine interstitial pores; many thin clay films lining pores and on faces of peds; about 45 percent gravel; strongly acid (pH 5.5); gradual wavy boundary.

R—32 inches; weakly consolidated conglomerate; fine grained matrix with rounded rock fragments 1 to 3 inches in diameter; very dense and extremely hard when dry.

The depth to weakly consolidated conglomerate ranges from 20 to 40 inches. The particle-size control section contains 35 to 55 percent clay.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. When moist, it has hue of 10YR, value of 3, and chroma of 2 to 4.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 7, and chroma of 3 to 8. When moist, it has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 8.

## Pardaloe Series

The Pardaloe series consists of very deep, well drained soils on mountains. These soils formed in residuum and colluvium derived from metavolcanic rocks. Slopes range from 50 to 75 percent. Mean annual precipitation is 40 to 55 inches. Mean annual air temperature is about 54 degrees F.

These soils are loamy-skeletal, mixed, mesic Typic Xerochrepts.

Typical pedon of Pardaloe very gravelly loam, in an area of Pardaloe-Goulding complex, 50 to 75 percent slopes; about 1.5 miles northeast of Helena; 2,300 feet east and 600 feet south of the northwest corner of sec. 22, T. 34 N., R. 11 W., Dedrick quadrangle.

About 30 percent of the surface is covered with gravel.

Oi—2 inches to 0; moss-covered, decaying needles, leaves, twigs, and bark.

A—0 to 6 inches; brown (7.5YR 4/4) very gravelly loam, dark brown (7.5YR 3/4) moist; moderate very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine, common fine, and few medium and coarse roots; many fine and very fine tubular pores; about 45 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

BA—6 to 15 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 4/4) moist; moderate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine and few medium and coarse roots; few medium, common fine, and many very fine tubular pores; about 40 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt1—15 to 28 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and common very fine roots; few medium and common fine and very fine tubular pores; few thin clay films lining pores; about 40 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—28 to 47 inches; brown (7.5YR 5/4) extremely gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and common very fine roots; few medium and common fine and very fine tubular pores; few thin clay films lining pores and on faces of peds; about 55 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); gradual wavy boundary.

Bt3—47 to 60 inches; brownish yellow (10YR 6/6) extremely gravelly sandy clay loam, strong brown (7.5YR 5/6) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few fine and very fine tubular pores; few thin clay films lining pores; about 55 percent gravel and 5 percent cobbles; slightly acid (pH 6.5).

The control section averages 35 to 55 percent rock fragments. Reaction is slightly acid or neutral throughout the profile.

The A horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. When moist, it has hue of 5YR to 10YR, value of 3 or 4, and chroma of 3 to 6. This horizon is gravelly loam or very gravelly loam. It contains 20 to 25 percent clay and 15 to 50 percent rock fragments.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 7, and chroma of 4 to 8. When moist, it has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6.

This horizon is very gravelly loam, extremely gravelly sandy clay loam, or extremely gravelly loam. It contains 20 to 27 percent clay and 30 to 65 percent rock fragments.

The Pardaloe soils in this survey area are deeper than is defined as the range for the series. This difference, however, does not significantly affect the use or management of the soils.

## Sheetiron Series

The Sheetiron series consists of moderately deep, well drained soils on mountains. These soils formed in colluvium and material weathered from mica schist. Slopes range from 50 to 90 percent. Mean annual precipitation is 60 to 70 inches. Mean annual air temperature is about 50 degrees F.

These soils are loamy-skeletal, mixed, mesic Dystric Xerochrepts.

Typical pedon of Sheetiron very gravelly loam, in an area of Sheetiron-Barpeak complex, 50 to 90 percent slopes; about 10 miles southeast of Douglas City; 500 feet west and 1,900 feet south of the northeast corner of sec. 13, T. 31 N., R. 9 W., Bully Choop Mountain quadrangle.

About 35 percent of the surface is partially covered with gravel, 10 percent with cobbles, and 3 percent with stones.

Oi—2 inches to 0; needles, leaves, twigs, cones, and branches.

A—0 to 4 inches; yellowish brown (10YR 5/4) very gravelly loam, dark brown (7.5YR 3/2) moist; moderate very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and many very fine roots; common fine and very fine tubular pores; about 40 percent gravel, 10 percent cobbles, and 1 percent stones; moderately acid (pH 6.0); clear wavy boundary.

Bw1—4 to 10 inches; yellowish brown (10YR 5/6) very gravelly loam, brown (7.5YR 4/4) moist; moderate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse, medium, and fine roots and many very fine roots; common fine and very fine tubular pores; about 35 percent gravel and 10 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

Bw2—10 to 19 inches; yellowish brown (10YR 5/6) very gravelly loam, brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; common fine and very fine tubular pores; about 40 percent gravel and 10 percent cobbles; strongly acid (pH 5.5); clear wavy boundary.

Bw3—19 to 24 inches; light yellowish brown (10YR 6/4) extremely gravelly loam, yellowish brown (10YR 5/6) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few coarse and medium and common fine and very fine roots; few fine and very fine tubular pores; about 55 percent gravel and 15 percent cobbles; strongly acid (pH 5.5); abrupt wavy boundary.

R—24 inches; fractured mica schist; fragments are 1 to 6 inches in diameter and are oriented along original fracture planes; soil and some roots filling some fractures.

The depth to bedrock ranges from 20 to 40 inches. The particle-size control section contains 15 to 25 percent clay and 35 to 70 percent rock fragments. The extent of the surface covered by rock fragments ranges from 10 to 55 percent. Reaction is strongly acid or moderately acid throughout the profile.

The A horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4. When moist, it has hue of 7.5YR or 10YR and value and chroma of 2 to 4.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 3 to 6. When moist, it has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 3 to 6. This horizon is very gravelly loam, extremely gravelly loam, or very gravelly sandy loam.

## Sheetiron Variant

The Sheetiron Variant consists of moderately deep, well drained soils on mountains. These soils formed in colluvium and material weathered from mica schist. Slopes range from 50 to 75 percent. Mean annual precipitation is 40 to 50 inches. Mean annual air temperature is about 54 degrees F.

These soils are fine-loamy, mixed, mesic Typic Haploxeralfs.

Typical pedon of Sheetiron Variant gravelly loam, in an area of Sheetiron Variant-Dedrick complex, 50 to 75 percent slopes; about 2 miles south of Douglas City; 2,600 feet east and 400 feet north of the southwest corner of sec. 13, T. 32 N., R. 10 W., Hoosimbim Mountain quadrangle.

About 10 percent of the surface is partially covered with gravel and 5 percent with cobbles.

Oi—2 inches to 0; leaves, needles, and twigs.

A—0 to 2 inches; strong brown (7.5YR 5/6) gravelly loam, reddish brown (5YR 4/4) moist; weak fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common

very fine roots; few fine and common very fine tubular pores; about 20 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt1—2 to 11 inches; strong brown (7.5YR 5/6) gravelly clay loam, reddish brown (5YR 4/4) moist; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; few fine and common very fine tubular pores; few thin clay films lining pores and on faces of peds; about 30 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—11 to 18 inches; strong brown (7.5YR 5/6) gravelly clay loam, yellowish red (5YR 4/6) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; few coarse roots and common medium, fine, and very fine roots; few fine and common very fine tubular pores; common thin clay films lining pores and on faces of peds; about 30 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

Bt3—18 to 31 inches; strong brown (7.5YR 5/6) very gravelly clay loam, yellowish red (5YR 4/6) moist; weak medium and fine subangular blocky structure; hard, friable, very sticky and plastic; few coarse and medium and common fine and very fine roots; few fine and common very fine tubular pores; many thin clay films lining pores and on faces of peds; about 55 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.

R—31 inches; fractured, hard mica schist.

The depth to bedrock ranges from 20 to 40 inches.

The A horizon has hue of 7.5YR, value of 5, and chroma of 4 to 6. When moist, it has hue of 5YR to 10YR and value and chroma of 4.

The Bt horizon has hue of 7.5YR, value of 5 to 7, and chroma of 4 to 6. When moist, it has hue of 5YR or 7.5YR, value of 4, and chroma of 4 to 6.

## Skyrock Series

The Skyrock series consists of shallow, somewhat excessively drained soils on mountains. These soils formed in residuum and colluvium derived from mica schist. Slopes range from 50 to 75 percent. Mean annual precipitation is 60 to 75 inches. Mean annual air temperature is about 44 degrees F.

These soils are loamy-skeletal, mixed, frigid Dystric Lithic Xerochrepts.

Typical pedon of Skyrock extremely gravelly loam, in an area of Beargulch-Skyrock complex, 50 to 75 percent slopes; about 1 mile northwest of Gunsight Peak; 600 feet west and 900 feet south of the northeast corner of sec. 13, T. 31 N., R. 9 W., Bully Choop Mountain quadrangle.

About 80 percent of the surface is partially covered with gravel and 1 percent with stones.

A—0 to 4 inches; light yellowish brown (10YR 6/4) extremely gravelly loam, dark yellowish brown (10YR 3/4) moist; weak very fine subangular blocky structure; loose, slightly sticky and slightly plastic; few fine and common very fine roots; few fine and very fine tubular pores; about 75 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bw1—4 to 10 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and fine and common very fine roots; few fine and very fine tubular pores; about 55 percent gravel; strongly acid (pH 5.5); gradual wavy boundary.

Bw2—10 to 18 inches; light yellowish brown and yellow (10YR 6/4 and 7/6) extremely gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, slightly sticky and slightly plastic; few medium and fine and common very fine roots; few fine and very fine tubular pores; about 65 percent gravel; strongly acid (pH 5.5); abrupt wavy boundary.

R—18 inches; fractured mica schist; fragments are 1 to 8 inches in diameter; some pockets of weathered rock; roots extend into some fractures.

The depth to bedrock ranges from 10 to 20 inches. The particle-size control section contains 15 to 40 percent mica minerals in the very fine sand fraction. It also contains 18 to 25 percent clay and 40 to 65 percent gravel.

The A horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. When moist, it has hue of 10YR and value and chroma of 3 or 4.

When moist, the Bw horizon has hue of 10YR, value of 3 or 4, and chroma of 4 to 6. This horizon is very gravelly loam, extremely gravelly loam, or extremely gravelly sandy clay loam.

## Skyrock Variant

The Skyrock Variant consists of shallow, well drained soils on mountains. These soils formed in colluvium weathered from ultrabasic rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is 60 to 70 inches. Mean annual air temperature is about 46 degrees F.

These soils are loamy-skeletal, mixed, frigid Dystric Lithic Xerochrepts.

Typical pedon of Skyrock Variant very stony loam, in an area of Skyrock Variant-Rock outcrop-Rubble land complex, 50 to 75 percent slopes; ½ mile east of Bully Choop Mountain; 1,350 feet east and 1,900 feet south of the northwest corner of sec. 10, T. 31 N., R. 8 W., Bully Choop Mountain quadrangle.

About 2 percent of the surface is partially covered with boulders, 20 percent with stones, 20 percent with cobbles, and 40 percent with gravel.

A—0 to 3 inches; yellowish brown (10YR 5/6) very stony loam, dark yellowish brown (10YR 4/6) moist; weak fine and very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; common very fine tubular pores; about 25 percent gravel and 15 percent cobbles; strongly acid (pH 5.5); clear wavy boundary.

Bt1—3 to 8 inches; yellowish brown (10YR 5/8) extremely cobbly loam, dark yellowish brown (10YR 4/6) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; common very fine tubular pores; few thin clay films lining pores and on faces of peds; about 25 percent gravel, 25 percent cobbles, and 10 percent stones; moderately acid (pH 6.0); gradual wavy boundary.

Bt2—8 to 13 inches; yellowish brown (10YR 5/8) extremely cobbly clay loam, dark yellowish brown (10YR 4/6) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; common very fine tubular pores; few thin clay films lining pores and on faces of peds; about 25 percent gravel, 25 percent cobbles, and 10 percent stones; moderately acid (pH 6.0); gradual wavy boundary.

R—13 inches; fractured ultrabasic rock with very few roots in fractures; clay films coating rocks.

The depth to bedrock ranges from 10 to 20 inches. The A and Bt horizons have hue of 10YR, value of 5, and chroma of 4 to 8.

## Springgulch Series

The Springgulch series consists of very deep, well drained soils on mountains. These soils formed in colluvium and material weathered from mica schist. Slopes range from 30 to 50 percent. Mean annual precipitation is 40 to 50 inches. Mean annual air temperature is about 60 degrees F.

These soils are fine, oxidic, thermic Haplic Palexeralfs.

Typical pedon of Springgulch gravelly clay loam (fig. 7), in an area of Springgulch-Brockgulch Variant complex, 30 to 50 percent slopes; about 3 miles southeast of Douglas City; 2,400 feet west and 1,650 feet south of the northeast corner of sec. 20, T. 32 N., R. 9 W., Hoosimbim Mountain quadrangle.

About 5 percent of the surface is partially covered with gravel.

A—0 to 4 inches; reddish brown (5YR 5/4) gravelly clay loam, dark reddish brown (2.5YR 3/4) moist; strong very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and many very fine roots; common very fine tubular pores; about 20 percent gravel; neutral (pH 7.0); abrupt wavy boundary.

BA—4 to 7 inches; reddish brown (5YR 5/4) gravelly clay loam, dark red (2.5YR 3/6) moist; weak medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; common fine and very fine tubular pores; about 15 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt1—7 to 13 inches; reddish brown (5YR 5/4) gravelly clay loam, dark red (2.5YR 3/6) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; common coarse, medium, fine, and very fine roots; few medium and common fine and very fine tubular pores; common thin clay films lining pores and on faces of peds; about 25 percent gravel; neutral (pH 7.0); gradual wavy boundary.

Bt2—13 to 20 inches; yellowish red (5YR 4/6) gravelly clay loam, dark red (2.5YR 3/6) moist; moderate medium and fine subangular blocky structure; hard, firm, very sticky and very plastic; common coarse, medium, fine, and very fine roots; few medium and common fine tubular pores; many thin clay films lining pores and on faces of peds; about 25 percent gravel; neutral (pH 7.0); gradual wavy boundary.

Bt3—20 to 34 inches; yellowish red (5YR 4/6) gravelly clay loam, dark red (2.5YR 3/6) moist; moderate medium and fine subangular blocky structure; hard, firm, very sticky and very plastic; common coarse, medium, fine, and very fine roots; few medium and common fine and very fine tubular pores; many thin clay films lining pores and on faces of peds; about 25 percent gravel; neutral (pH 7.0); gradual wavy boundary.

Bt4—34 to 50 inches; yellowish red (5YR 5/6) gravelly clay loam, red (2.5YR 4/6) moist; moderate medium and fine subangular blocky structure; hard, firm, very sticky and very plastic; few coarse and medium

**Figure 7.—A profile of Springgulch gravelly clay loam. The content of gravel increases below a depth of 50 inches. Depth is marked in feet.**

and common fine and very fine roots; few fine and common very fine tubular pores; many thin clay films lining pores and on faces of peds; about 30 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt5—50 to 75 inches; red (2.5YR 5/6 and 5/8) very gravelly clay loam, dark red (2.5YR 3/6) moist; moderate medium and fine subangular blocky structure; very hard, firm, very sticky and very plastic; few fine and very fine roots; few fine and very fine tubular pores; many thin clay films lining pores and on faces of peds; about 40 percent gravel; neutral (pH 7.0).

The content of clay in the particle-size control section ranges from 35 to 45 percent. The average content of rock fragments in the particle-size control section ranges from 15 to 30 percent.

The A horizon has hue of 2.5YR to 7.5YR, value of 5, and chroma of 4. When moist, it has hue of 2.5YR to 7.5YR, value of 3 or 4, and chroma of 4. This horizon is neutral or slightly acid.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. When moist, it has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 6. The upper part of this horizon is gravelly clay loam, clay loam, or gravelly clay, and the lower part is very gravelly clay or very gravelly clay loam. Reaction ranges from neutral to moderately acid.

## Tallowbox Series

The Tallowbox series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from granitic rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is 40 to 65 inches. Mean annual air temperature is about 47 degrees F.

These soils are coarse-loamy, mixed, mesic Typic Xerochrepts.

Typical pedon of Tallowbox gravelly coarse sandy loam, in an area of Tallowbox-Minersville complex, 30 to 50 percent slopes, about 1 mile west of Trinity Dam Boulevard on Highway 299, north on dirt road 0.1 mile to landing, 100 yards uphill; 1,500 feet west and 2,000 feet north of the southeast corner of sec. 31, T. 33 N., R. 8 W., Lewiston quadrangle.

Oi—2 inches to 0; mostly conifer needles, twigs, limbs, and cones and some oak leaves.

A1—0 to 1 inch; dark grayish brown (10YR 4/2) gravelly coarse sandy loam, very dark gray (10YR 3/1) moist; moderate fine, medium, and coarse granular structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine interstitial pores; about 20 percent fine gravel; slightly acid (pH 6.5); abrupt wavy boundary.

A2—1 to 9 inches; light brownish gray (10YR 6/2) gravelly coarse sandy loam, dark grayish brown (10YR 4/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine and fine and common medium and coarse roots; common very fine and fine tubular pores and many very fine and

fine interstitial pores; about 20 percent fine gravel; slightly acid (pH 6.5); clear wavy boundary.
Bw1—9 to 14 inches; light brownish gray (10YR 6/2) gravelly coarse sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine and fine, common medium, and few coarse roots; common very fine and fine tubular pores and many very fine and fine interstitial pores; about 15 percent fine gravel; moderately acid (pH 6.0); abrupt wavy boundary.
Bw2—14 to 23 inches; pale brown (10YR 6/3) gravelly coarse sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots; common very fine and fine tubular pores and many very fine and fine interstitial pores; about 15 percent fine gravel; moderately acid (pH 6.0); abrupt wavy boundary.
Cr—23 inches; weathered granitic rock; colors are variable; some strong brown (7.5YR 4/6) stains in the upper few inches.

The depth to paralithic contact ranges from 20 to 40 inches. The profile averages 15 to 35 percent fine gravel and 35 to 50 percent coarse and very coarse sand, and no other sand size dominates. The content of clay averages 10 to 15 percent.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 2 or 3. It is slightly acid or moderately acid.

The Bw horizon has hue of 10YR, value of 5 to 7, and chroma of 2 to 4. It is gravelly coarse sandy loam or sandy loam. It ranges from slightly acid to strongly acid.

The Tallowbox soils in this survey area have more precipitation, a shorter frost-free season, and slightly wider range in content of clay than are defined as the range for the series. These differences, however, do not significantly affect the use or management of the soils.

## Valcreek Series

The Valcreek series consists of moderately deep, excessively drained soils on mountains. These soils formed in material weathered from granitic rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is 55 to 65 inches. Mean annual air temperature is about 47 degrees F.

These soils are sandy-skeletal, mixed, mesic Typic Xerorthents.

Typical pedon of Valcreek very gravelly loamy coarse sand, in an area of Valcreek-Minersville-Choop complex, 30 to 75 percent slopes; about 1 mile south of Buckhorn Summit; 500 feet west and 1,600 feet south of the northeast corner of sec. 22, T. 32 N., R. 8 W., Shasta Bally quadrangle.

Oi—3 inches to 0; needles, leaves, twigs, and cones.
A1—0 to 3 inches; pale brown (10YR 6/3) very gravelly loamy coarse sand, dark grayish brown (10YR 4/2) moist; weak very fine subangular blocky structure; loose, nonsticky and nonplastic; many very fine roots; common very fine interstitial pores; about 35 percent gravel; moderately acid (pH 6.0); clear wavy boundary.
A2—3 to 8 inches; pale brown (10YR 6/3) fine gravelly loamy coarse sand, dark grayish brown (10YR 4/2) moist; weak very fine granular structure; loose, nonsticky and nonplastic; common fine and many very fine roots; common very fine interstitial pores; about 25 percent fine gravel; moderately acid (pH 6.0); clear wavy boundary.
C1—8 to 16 inches; very pale brown (10YR 8/3) fine gravelly loamy coarse sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic; few fine and very fine roots; common very fine interstitial pores; about 30 percent fine gravel; moderately acid (pH 6.0); gradual wavy boundary.
C2—16 to 31 inches; very pale brown (10YR 8/3) extremely gravelly loamy coarse sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; common very fine interstitial pores; about 65 percent fine gravel; moderately acid (pH 6.0); clear irregular boundary.
Cr—31 inches; soft, weathered granitic rock; can be dug with a spade with difficulty; material separates into individual coarse sand and fine pebble-sized particles when crushed; no roots.

The depth to weathered granitic rock ranges from 20 to 40 inches. In some pedons, 10 to 30 percent of the surface is covered with fine gravel. The content of rock fragments in the particle-size control section averages 35 to 60 percent.

The A horizon has hue of 10YR, value of 3 to 7, and chroma of 1 to 3. When moist, it has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. This horizon is moderately acid or strongly acid. It contains 3 to 8 percent clay.

The C horizon is a mixture of colors, including hue of 10YR, value of 5 to 8, and chroma of 1 to 4. When moist, it has hue of 10YR, value of 2 to 8, and chroma of 1 to 4. This horizon is fine gravelly loamy coarse sand, very gravelly loamy coarse sand, extremely gravelly loamy coarse sand, or extremely gravelly coarse sand. It contains 25 to 65 percent fine gravel

and 2 to 6 percent clay. It ranges from moderately acid to very strongly acid.

## Vanvor Series

The Vanvor series consists of moderately deep, well drained soils on mountains. These soils formed in residuum and colluvium derived from metavolcanic rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is 30 to 60 inches. Mean annual air temperature is about 54 degrees F.

These soils are loamy-skeletal, mixed, mesic Mollic Haploxeralfs.

Typical pedon of Vanvor very gravelly sandy clay loam, in an area of Vanvor-Hoosimbim complex, 50 to 75 percent slopes; about 3.5 miles southwest of Douglas City; 1,500 feet east and 750 feet south of the northwest corner of sec. 22, T. 32 N., R. 10 W., Hoosimbim Mountain quadrangle.

About 30 percent of the surface is partially covered with gravel.

Oi—1 inch to 0; leaves and twigs.
A—0 to 6 inches; brown (7.5YR 4/4) very gravelly sandy clay loam, dark brown (7.5YR 3/4) moist; strong fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; few medium and common fine and very fine tubular pores; about 40 percent gravel; neutral (pH 7.0); clear wavy boundary.
Bt1—6 to 14 inches; strong brown (7.5YR 5/6) very gravelly sandy clay loam, brown (7.5YR 4/4) moist; strong medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; common medium, fine, and very fine tubular pores; few thin clay films lining pores; about 50 percent gravel; strongly acid (pH 5.5); clear wavy boundary.
Bt2—14 to 24 inches; strong brown (7.5YR 5/6) very gravelly clay loam, brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few coarse and medium and common fine and very fine roots; few medium and common fine and very fine tubular pores; common thin clay films lining pores and on faces of peds; about 50 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.
BCt—24 to 31 inches; strong brown (7.5YR 5/6) extremely gravelly clay loam, strong brown (7.5YR 4/6) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few fine and very fine tubular pores; few thin clay films lining pores and coating rocks; about 65 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.
R—31 inches; fractured, hard schist; fractures are 1 to 2 inches apart; clay films line some of the fractures.

The depth to bedrock and the thickness of the solum range from 20 to 40 inches.

The A horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4. When moist, it has hue of 5YR to 10YR, value of 3, and chroma of 4. This horizon is slightly acid or neutral.

The Bt horizon has hue of 5YR to 10YR and value and chroma of 4 to 6. When moist, it has hue of 5YR to 10YR, value of 3 to 5, and chroma of 4 to 6. This horizon is very gravelly sandy clay loam, very gravelly clay loam, extremely gravelly clay loam, very gravelly loam, or extremely gravelly sandy clay loam. It contains 40 to 70 percent rock fragments and 25 to 35 percent clay. It ranges from strongly acid to slightly acid.

## Vitzthum Series

The Vitzthum series consists of shallow, somewhat excessively drained soils on mountains. These soils formed in residuum and colluvium derived from metavolcanic rocks. Slopes range from 50 to 75 percent. Mean annual precipitation is 30 to 60 inches. Mean annual air temperature is about 55 degrees F.

These soils are loamy-skeletal, mixed, mesic Lithic Haploxeralfs.

Typical pedon of Vitzthum extremely gravelly loam, in an area of Goulding-Vitzthum-Vanvor complex, 50 to 75 percent slopes; about 7.5 miles southeast of Douglas City; 850 feet west and 900 feet north of the southeast corner of sec. 8, T. 31 N., R. 9 W., Hoosimbim Mountain quadrangle.

About 75 to 100 percent of the surface is partially covered with gravel.

Oi—1 inch to 0; leaves and twigs.
A—0 to 3 inches; dark yellowish brown (10YR 4/4) extremely gravelly loam, dark yellowish brown (10YR 3/4) moist; moderate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine and very fine tubular pores; about 60 percent gravel; slightly acid (pH 6.5); clear wavy boundary.
Bt1—3 to 9 inches; brown (7.5YR 5/4) extremely gravelly sandy clay loam, brown (7.5YR 4/4) moist; strong medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium, fine, and very fine

roots; many medium, fine, and very fine tubular pores; few thin clay films lining pores; about 60 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bt2—9 to 13 inches; strong brown (7.5YR 5/6) extremely gravelly sandy clay loam, brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few coarse, medium, fine, and very fine roots; common medium, fine, and very fine interstitial pores; common thin clay films lining pores and on faces of peds; about 70 percent gravel; slightly acid (pH 6.3); gradual wavy boundary.

Bt3—13 to 17 inches; strong brown (7.5YR 5/6) extremely gravelly sandy clay loam, brown (7.5YR 4/4) moist; strong medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; few coarse, medium, fine, and very fine roots; common medium, fine, and very fine interstitial pores; many thin clay films lining pores and on faces of peds; about 60 percent gravel; slightly acid (pH 6.3); abrupt wavy boundary.

R—17 inches; hard, fractured metavolcanic rock; fractures are 1 to 2 inches apart; roots extending into some fractures; the upper inch of rock is weathered.

The depth to bedrock ranges from 10 to 20 inches.

The A horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. When moist, it has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. This horizon is slightly acid or neutral.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 6. When moist, it has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 8. This horizon is very gravelly loam, extremely gravelly clay loam, or extremely gravelly sandy clay loam. It contains 35 to 70 percent rock fragments and 20 to 35 percent clay.

The Vitzthum soil in map unit 207 is a taxadjunct because it does not have an argillic horizon. Also, it has a higher mean annual soil temperature and contains more mica minerals than are typical for the series. These differences, however, do not significantly affect the use or management of the soil.

## Weaverville Series

The Weaverville series consists of very deep, well drained soils on hills. These soils formed in material weathered from weakly consolidated, moderately fine grained sediments or colluvium. Slopes range from 9 to 50 percent. Mean annual precipitation is 30 to 50 inches. Mean annual air temperature is about 51 degrees F.

These soils are fine-loamy, oxidic, mesic Ultic Palexeralfs.

Typical pedon of Weaverville loam, in an area of Musserhill-Weaverville complex, 30 to 50 percent slopes; about 1.5 miles northwest of Weaverville; on Oregon Street 2.2 miles west of the intersection of Highways 299 and 3 in Weaverville, in an old roadcut; 2,300 feet east and 1,600 feet south of the northwest corner of sec. 11, T. 33 N., R. 10 W., Weaverville quadrangle.

About 10 percent of the surface is partially covered with gravel, and 2 percent is covered with cobbles.

Oi—1 inch to 0; needles, leaves, twigs, and cones.

A—0 to 4 inches; reddish brown (5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; strong fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few coarse roots and common fine, medium, and very fine roots; few fine and common very fine tubular pores; about 10 percent gravel; few fine pieces of charcoal; slightly acid (pH 6.5); clear wavy boundary.

Bt1—4 to 15 inches; yellowish red (5YR 5/6) gravelly loam, dark reddish brown (2.5YR 3/4) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; common coarse, medium, fine, and very fine roots; few medium and common fine and very fine tubular pores; common thin clay films lining pores and on faces of peds; about 20 percent gravel; few fine pieces of charcoal; slightly acid (pH 6.5); clear wavy boundary.

Bt2—15 to 27 inches; yellowish red (5YR 5/6) gravelly clay loam, dark red (2.5YR 3/6) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common coarse, medium, fine, and very fine roots; few fine and common very fine tubular pores; many thin clay films lining pores and on faces of peds; about 25 percent gravel; common fine pieces of charcoal; moderately acid (pH 6.0); gradual wavy boundary.

Bt3—27 to 39 inches; yellowish red (5YR 4/6) gravelly clay loam, dark red (2.5YR 3/6) moist; moderate medium and fine subangular blocky structure; very hard, friable, very sticky and very plastic; common coarse, medium, fine, and very fine roots; few fine and common very fine tubular pores; many thin clay films lining pores and on faces of peds; about 25 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.

Bt4—39 to 56 inches; red (2.5YR 4/8) gravelly clay loam, red (2.5YR 4/6) moist; moderate medium subangular blocky structure; very hard, firm, very

sticky and very plastic; few coarse, medium, and fine roots and common very fine roots; few fine and very fine tubular pores; many thin clay films lining pores and on faces of peds; about 30 percent gravel; common fine black manganese stains; strongly acid (pH 5.5); gradual wavy boundary.

Bt5—56 to 81 inches; red (2.5YR 4/8) very gravelly clay loam, red (2.5YR 4/6) moist; moderate medium subangular blocky structure; very hard, firm, very sticky and very plastic; few coarse, medium, fine, and very fine roots; few fine and very fine tubular pores; many thin clay films lining pores and on faces of peds; about 35 percent gravel; common fine black manganese stains and fine shot; strongly acid (pH 5.5).

The particle-size control section averages 27 to 35 percent clay and 10 to 25 percent rock fragments.

The A horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6. When moist, it has hue of 2.5YR to 7.5YR, value of 3 or 4, and chroma of 3 to 6. This horizon is clay loam or loam. It is slightly acid or neutral.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. When moist, it has hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 4 to 8. This horizon is mainly gravelly clay loam, gravelly loam, clay loam, or cobbly clay loam. In some pedons it is very gravelly clay loam in the lower part. It ranges from strongly acid to neutral. The base saturation is 40 to 60 percent by sum of cations.

## Weitchpec Series

The Weitchpec series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from serpentinitic rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is 30 to 60 inches. Mean annual air temperature is about 54 degrees F.

These soils are loamy-skeletal, serpentinitic, mesic Typic Xerochrepts.

Typical pedon of Weitchpec gravelly loam, in an area of Weitchpec-Dubakella complex, 30 to 50 percent slopes; about 1.5 miles southwest of Weaverville; 1,350 feet west and 650 feet south of the northeast corner of sec. 14, T. 33 N., R. 10 W., Weaverville quadrangle.

About 10 percent of the surface is partially covered with gravel, and 5 percent is covered with cobbles.

Oi—1 inch to 0; needles, leaves, and twigs.

A—0 to 4 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few medium and common fine and very fine roots; few fine and common very fine tubular pores; about 15 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt—4 to 10 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse, medium, fine, and very fine roots; few fine and common very fine tubular pores; few thin clay films lining pores and on faces of peds; about 20 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

C1—10 to 17 inches; pink (7.5YR 7/4) very gravelly loam, strong brown (7.5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few coarse roots and common medium, fine, and very fine roots; few fine and common very fine tubular pores; about 30 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); gradual wavy boundary.

C2—17 to 29 inches; pink (7.5YR 7/4) very gravelly loam, strong brown (7.5YR 4/6) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few coarse roots and common medium, fine, and very fine roots; few fine and common very fine tubular pores; about 45 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

R—29 inches; fractured serpentinite; fractures 2 to 3 inches apart; roots in some pockets.

The depth to bedrock ranges from 20 to 40 inches. The particle-size control section contains 40 to 55 percent rock fragments.

The A horizon has hue of 5YR or 7.5YR, value of 5, and chroma of 4 to 6.

The Bt horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. When moist, it has hue of 5YR or 7.5YR, value of 4, and chroma of 4 to 6. Reaction is slightly acid or neutral.

## Weitchpec Variant

The Weitchpec Variant consists of deep, well drained soils on mountains. These soils formed in residuum and colluvium derived from peridotite and other ultrabasic rocks. Slopes range from 30 to 75 percent. Mean annual precipitation is 55 to 65 inches. Mean annual air temperature is about 47 degrees F.

These soils are clayey-skeletal, mixed, mesic Mollic Haploxeralfs.

Typical pedon of Weitchpec Variant gravelly loam, in an area of Weitchpec Variant-Bamtush Variant complex, 50 to 75 percent slopes; about 3 miles south of Lewiston; 2,550 feet west and 1,550 feet south of the

northeast corner of sec. 6, T. 32 N., R. 8 W., Lewiston quadrangle.

About 10 percent of the surface is partially covered with gravel, and 1 percent is covered with stones.

Oi—1 inch to 0; leaves, needles, twigs, and cones partially covered with moss.
A—0 to 4 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine and very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few fine and common very fine roots; common fine and many very fine tubular pores; about 20 percent gravel; slightly acid (pH 6.5); clear wavy boundary.
AB—4 to 9 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and fine and common very fine roots; common fine and very fine tubular pores; about 20 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.
Bt1—9 to 14 inches; yellowish brown (10YR 5/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; common coarse, medium, fine, and very fine roots; few fine and common very fine tubular pores; few thin clay films lining pores and on faces of peds; about 25 percent gravel and 10 percent cobbles; strongly acid (pH 5.5); gradual wavy boundary.
Bt2—14 to 23 inches; yellowish brown (10YR 5/6) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium and fine subangular blocky structure; very hard, firm, sticky and plastic; few coarse and medium and common fine and very fine roots; few fine and common very fine tubular pores; many thin clay films lining pores and on faces of peds; about 35 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.
Bt3—23 to 30 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; few medium and common fine roots; common fine and very fine tubular pores; common thin clay films lining pores and on faces of peds; about 40 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.
BCt—30 to 37 inches; light yellowish brown (10YR 6/4) extremely gravelly clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; few medium, fine, and very fine roots; common fine and very fine tubular pores; few thin clay films lining pores; about 60 percent gravel and 15 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.
C—37 to 48 inches; light yellowish brown (10YR 6/4) extremely gravelly clay loam, brown (10YR 5/3) moist; massive; hard, friable, sticky and plastic; few coarse, medium, and fine roots; common very fine tubular pores; about 60 percent gravel and 25 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.
R—48 inches; fractured ultrabasic rock; a small amount of soil material in cracks.

The depth to fractured ultrabasic rock ranges from 40 to 60 inches.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3. When moist, it has hue of 10YR, value of 3, and chroma of 2 or 3. This horizon is 4 to 6 inches thick.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. When moist, it has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

## Xeralfs

Xeralfs consist of shallow to very deep, well drained soils on hills and terraces. These soils formed in alluvium derived from mixed rock sources and weakly consolidated nonmarine sediments. They are in areas that have been disturbed during hydraulic mining activities. Many feet of soil material have been removed in some areas. The A horizon has reformed in old B horizon material. Slopes range from 5 to 50 percent. Mean annual precipitation is 30 to 40 inches. Mean annual air temperature is about 53 degrees F.

Reference pedon of Xeralfs, in an area of Xeralfs-Xerorthents complex, 5 to 50 percent slopes; about 1.5 miles northwest of Junction City; 2,150 feet east and 1,150 feet north of the southwest corner of sec. 35, T. 34 N., R. 11 W., Dedrick quadrangle.

About 10 percent of the surface is partially covered with pebbles, and 10 percent is covered with cobbles.

Oi—2 inches to 0; leaves, needles, and twigs.
A—0 to 1 inch; strong brown (7.5YR 5/6) very gravelly clay loam, yellowish red (5YR 4/6) moist; strong fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine and very fine roots; common fine and very fine tubular pores; about 45 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.
Bt—1 to 23 inches; red (2.5YR 5/6) extremely gravelly clay loam, red (2.5YR 4/6) moist; weak medium and fine subangular blocky structure; hard, friable, sticky and plastic; few medium, fine, and very fine roots;

few very fine tubular pores; many thin clay films lining pores and on faces of peds; about 55 percent gravel and 10 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

BCt—23 to 30 inches; reddish yellow (5YR 6/6) extremely gravelly clay loam, yellowish red (5YR 5/6) moist; weak medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few medium, fine, and very fine roots; few very fine tubular pores; common thin clay films lining pores and on faces of peds; about 70 percent gravel and 10 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

2Cr—30 inches; weakly consolidated sedimentary rock.

The depth to weakly consolidated material ranges from 10 to more than 60 inches. Colors, textures, and reaction are variable.

## Xererts

Xererts consist of deep or very deep, well drained soils on hills with gilgai microrelief. These soils formed in material weathered from weakly consolidated mudstone and siltstone. Slopes range from 2 to 15 percent. Mean annual precipitation is 30 to 40 inches. Mean annual air temperature is about 53 degrees F.

Reference pedon of Xererts, 2 to 15 percent slopes; about 1.75 miles southwest of Hayfork; 2,550 feet east and 2,550 feet south of the northwest corner of sec. 15, T. 31 N., R. 12 W., Hayfork quadrangle.

About 10 percent of the surface is partially covered with gravel, 25 percent with cobbles, and 1 percent with stones.

A—0 to 3 inches; brown (10YR 5/3) cobbly clay loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; hard, firm, very sticky and very plastic; few fine and many very fine roots; few fine and common very fine tubular pores; about 10 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bss1—3 to 15 inches; light brownish gray (10YR 6/2) clay, brown (10YR 5/3) moist; many medium faint yellowish brown (10YR 5/8) mottles; strong coarse prismatic structure parting to moderate medium subangular blocky; extremely hard, extremely firm, extremely sticky and extremely plastic; few fine and common very fine roots; moderate medium and fine interstitial pores; few intersecting slickensides; about 10 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

Bss2—15 to 33 inches; light olive brown (10YR 5/4) clay, olive brown (2.5YR 4/4) moist; many medium faint yellowish brown (10YR 5/8) mottles; strong coarse prismatic structure parting to moderate medium subangular blocky; extremely hard, extremely firm, extremely sticky and extremely plastic; few fine and very fine roots; common medium and fine interstitial pores; few intersecting slickensides; about 5 percent gravel; neutral (pH 7.0); clear wavy boundary.

C—33 to 60 inches; light olive brown (2.5YR 5/4) clay, olive brown (2.5YR 4/4) moist; strong coarse prismatic structure; extremely hard, extremely firm, extremely sticky and extremely plastic; few very fine roots; common medium and fine interstitial pores; moderately alkaline (pH 8.0).

The depth to weakly consolidated mudstone or siltstone ranges from 40 to more than 60 inches.

The A horizon has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 2 or 3. When moist, it has hue of 2.5YR to 10YR, value of 3 or 4, and chroma of 1 to 3. This horizon is clay loam or cobbly clay loam.

The Bss and C horizons have hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 2 to 4. When moist, they have hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 1 to 4. These horizons contain 35 to 75 percent clay and 0 to 10 percent gravel.

When the soils are dry, cracks ¼ to 1 inch wide extend from the surface to a depth of 40 inches or more.

## Xerofluvents

Xerofluvents consist of shallow to very deep, well drained soils on alluvial fans and stream terraces. These soils formed in alluvium derived from mixed rock sources. Slopes range from 0 to 9 percent. Mean annual precipitation is 30 to 45 inches. Mean annual air temperature is about 53 degrees F.

Reference pedon of Xerofluvents, in an area of Atter-Dumps, dredge tailings-Xerofluvents complex, 2 to 9 percent slopes; about 5 miles south of Douglas City; 2,300 feet west and 750 feet north of the southeast corner of sec. 31, T. 31 N., R. 9 W., Hoosimbim Mountain quadrangle.

About 15 percent of the surface is partially covered with gravel.

A—0 to 5 inches; variegated brown, light brownish gray, and dark grayish brown (10YR 5/3, 6/2, and 4/2) gravelly sand, brown and dark brown (10YR 4/3 and 3/3) moist; single grain; loose, nonsticky and nonplastic; common very fine roots; few very fine interstitial pores; about 30 percent gravel; neutral (pH 7.0); clear wavy boundary.

2C—5 to 13 inches; variegated brown, pale brown, and very dark grayish brown (10YR 5/3, 6/3, and 3/2)

extremely gravelly coarse sand, grayish brown, dark grayish brown, and very dark brown (10YR 5/2, 4/2, and 3/2) moist; single grain; loose, nonsticky and nonplastic; common very fine roots; few very fine interstitial pores; about 75 percent gravel; neutral (pH 7.0); clear wavy boundary.

3Ab—13 to 23 inches; brown (10YR 5/3) very gravelly fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine roots; few very fine tubular pores; about 40 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

4C—23 to 60 inches; variegated brown, pale brown, grayish brown, and very dark grayish brown (10YR 5/3, 6/3, and 3/2) extremely gravelly coarse sand, grayish brown, dark grayish brown, and very dark brown (10YR 5/2, 4/2, and 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine interstitial pores; about 60 percent gravel and 20 percent cobbles; neutral (pH 7.0).

Colors and textures are variable.

## Xerorthents

Xerorthents consist of shallow to very deep, well drained soils on mountains, terraces, and hills that have been severely disturbed by hydraulic mining activity. Many feet of material have been removed from the surface. These soils formed in alluvium derived from mixed rock sources and material weathered from schist. Slopes range from 2 to 50 percent. Mean annual precipitation is 30 to 50 inches. Mean annual air temperature is about 53 degrees F.

Reference pedon of Xerorthents, in an area of Xeralfs-Xerorthents complex, 5 to 50 percent slopes; about 5 miles east of Weaverville; 900 feet east and 1,300 feet south of the northwest corner of sec. 10, T. 33 N., R. 10 W., Weaverville quadrangle.

About 20 percent of the surface is partially covered with gravel, 10 percent with cobbles, and 5 percent with stones.

A—0 to 4 inches; dark gray (N 4/0) very gravelly clay loam, dark gray (N 4/0) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; common fine and very fine and few medium roots; few very fine tubular pores; about 45 percent gravel and 5 percent cobbles; mildly alkaline (pH 7.5); clear wavy boundary.

C—4 to 12 inches; dark gray (N 4/0) extremely gravelly loam, dark gray (N 4/0) moist; massive; hard, friable, sticky and plastic; common very fine and few very fine roots; about 65 percent gravel; mildly alkaline (pH 7.5); abrupt wavy boundary.

R—12 inches; extremely platy metasedimentary rock.

Colors, textures, and reaction are variable.

# Formation of the Soils

## Factors of Soil Formation

Soil is a three-dimensional body covering the land surface and supporting plants. This covering has developed through natural formation processes. The processes that influence soil development are the result of an interaction of the geologic parent material with living organisms (plants and animals), topography, climate, and time. The interaction of these five soil-forming factors affects the formation of every soil. Variations in soil depth and internal properties from one place to another result from the interaction of these soil-forming factors. Humans have had an increasing influence on soil formation. Many of their activities result in changes in the five soil-forming factors.

### Living Organisms

While the soil itself is not considered to be alive, its mineral and organic components are critical as a substrate for myriads of micro-organisms and macro-organisms. These organisms perform many important decomposition tasks that transform organic materials into plant-available nutrients. Larger organisms also mix the soil as they move through it. Human alterations of the soil affect not only the physical properties of the soil, such as permeability, but also the composition of the populations of organisms that exist in the soil. These changes may favor various fungi or bacteria over existing species and may alter the processes that produce plant-available nutrients.

Changes in the soil also affect surface components of ecosystems (plants and animals) that are in dynamic equilibrium with the micro-ecosystem in the soil. Soil is an integral part of living systems; it influences the composition and processes of living systems. It is much more than a stack of mineral particles with leaves, needles, and twigs on top. Each soil has developed in a unique manner through natural processes.

### Geology, Geomorphology, and Parent Material

The survey area is in the Klamath Mountains Province. The Klamath Mountains were formed during the same time as the Sierra Nevada Range uplift (Nevadan Orogeny). The area is made up of very complex, uplifted and folded metamorphic rocks intruded by granitic plutons and ultrabasic bodies. These metamorphic rocks were placed as accreted terranes during subduction of the Pacific Plate under the continent (Irwin, 1986). A few areas are underlain by sedimentary rocks of varying consolidation (Irwin, 1966; American Geological Institute, 1976; Chesterman, 1978; Matsch, 1976).

The mountain ridges separate narrow valleys. Hayfork Valley is an example. In these valleys the youngest stream terraces are made up of Holocene-age alluvium (Irwin, 1966; Davis, 1966). At intermediate elevations above the current stream channels are remnant terrace deposits of Tertiary age. These Tertiary deposits were partially eroded, and the Holocene material was deposited on the eroded surface. Higher up, along the margins of the major valleys, are older deposits of Oligocene-epoch nonmarine material (Weaverville Formation). This material was partially eroded to form the valley surface on which the Tertiary sediments were deposited.

The flood plains and terraces in the Holocene-age material have several different surfaces in Hayfork Valley. The various surfaces of these terraces have low relief, have smooth gradual separations, and are very narrow. The soils have developed similar properties, that is, mollic epipedons and argillic horizons. Because of differences in parent material, soils directly adjacent to Hayfork and Big Creeks are in a loamy-skeletal family. Carrcreek soils (Pachic Argixerolls) are examples. Soils farther away from the streams are in a fine-loamy family. Haysum soils (Pachic Argixerolls) are examples (Parsons and Herriman, 1970; Gelderman and Parsons, 1972).

The remnant terraces underlain by the Tertiary deposits have been stable long enough for strong development of the soils. Jafa soils (Ultic Palexeralfs) are examples.

The Oligocene material (Weaverville Formation) is weakly consolidated. This formation has several component beds that have been deformed in places by uplifting. The material in some areas, such as in

Hayfork Valley, is fine grained sediments that were deposited by slowly moving water (estuaries) or in lakes (Irwin, 1966). In other areas this material was deposited by rapidly moving streams and contains many large rounded rock fragments. In some other areas, the material is influenced by glacial outwash from the Trinity Alps and the rock fragments are angular (Sharp, 1960). This material fills the Hayfork and Weaverville basins and is as much as 2,000 feet thick in Hayfork Valley. It extends at low elevations along the Trinity River and its tributaries. Some small deposits of this material are on Oregon Mountain and near Junction City (Irwin, 1966).

The grain size of the parent material influences the morphology of the soils. The several different soils that are forming on the Weaverville Formation illustrate this characteristic. The Crefork soils (Typic Haploxeralfs) are forming in the fine grained materials in Hayfork Valley and are in a fine textured family. The Musserhill soils (Ultic Haploxeralfs) are forming in weakly consolidated conglomerate of rounded pebbles and cobbles and are in a loamy-skeletal family. The Weaverville soils (Ultic Palexeralfs) are forming in moderately fine grained material and are in a fine-loamy family (Parsons and others, 1973).

Soils forming on the mountains adjacent to these valleys occur in very complex patterns because of variations in the geologic material. They also vary within a geologic formation because of variations in topography, climate, living organisms, and time.

Variations in geology exert striking effects on soil development. Soils forming in decomposed granitic rock (mostly mesozoic quartz diorite and granodiorite) contain many fine pebbles and large amounts of coarse and very coarse sand. In most parts of this survey area, these soils are very highly erodible. Consequently, the development of distinct horizons is only slight. Material is being removed nearly as quickly as it is being weathered. Dominantly these soils have ochric epipedons and cambic horizons. Minersville soils (Typic Xerochrepts) are examples. Some areas on top of ridges or on exposed, sparsely vegetated slopes have undergone very little soil development. Valcreek soils (Typic Xerorthents) are examples. Despite the fact that these soils are coarse textured and receive an average of about 50 inches of precipitation each year and therefore are affected by a strong leaching environment, the base saturation is high enough for them to be in Typic subgroups. Cation-exchange capacity is very low (normally less than 10 milliequivalents per 100 grams).

Mica schist (Pre-Silurian) is a major parent rock in the survey area. Soils that formed in this material in areas that receive more than 60 inches of precipitation and that are on active, very steep or extremely steep slopes exhibit only slight soil development. Barpeak soils (Dystric Xerochrepts) are examples. Soils that formed in areas that receive 30 to 60 inches of precipitation and that are on less active slopes have weakly to strongly developed argillic horizons. Examples are Brownscreek soils (Ultic Haploxeralfs) and Dougcity soils (Ultic Palexeralfs). Strong weathering of these soils has resulted in the accumulation of enough iron and aluminum oxides to place them in an oxidic family.

Another significant parent rock in the survey area is intrusive ultrabasic rock. This rock type occurs in narrow bands along major geologic contacts (Irwin, 1966). In some areas this rock has been strongly serpentinized. The dominant soils that formed in this material are Dubakella soils (Mollic Haploxeralfs) and Weitchpec soils (Typic Xerochrepts). These soils are in a serpentinitic family.

Various metamorphic rock and some sedimentary rock make up the remainder of the geologic formations underlying the mountains. Some of the soil development relationships in these areas are described in the following sections.

**Topography**

Topography strongly influences soil formation in the survey area. Steep to extremely steep mountain slopes that are deeply dissected by well developed drainageways are dominant in the area. These slopes are actively forming.

Soils that formed on the active, extremely steep slopes, such as Sheetiron soils (Dystric Xerochrepts), show little soil development. Even these soils have developed an A horizon (ochric epipedon) and show evidence of soil structure (cambic horizon). In some areas where very steep slopes have been less active, an argillic horizon has formed. Hoosimbim soils (Ultic Haploxeralfs) are examples of soils that formed in these areas (Balster and Parsons, 1966).

The survey area also features nearly level stream terraces and nearly level to moderately steep terraces and hills. On the nearly level stream terraces in Hayfork Valley, where the soils are no longer subject to inundation by floodwater, a mollic epipedon and an argillic horizon have formed. Haysum soils (Pachic Argixerolls) are examples.

Topography also influences local microclimate. The deeply dissected mountain slopes have formed long inclined surfaces that are directed toward the sun (south-facing slopes) or away from the sun (north-facing slopes). The south-facing slopes are hotter and drier than north aspects. The east aspects receive sunlight mostly in the morning when air temperatures are cool. The west aspects receive sunlight mostly in the afternoon and evening when air temperatures are warm

or hot. These differences in slope aspect greatly influence soil formation.

On south aspects, the temperatures are higher and the soils dry sooner in the summer. The dryness of these soils allows for only limited soil formation. Moisture must be available when temperatures are warm enough to drive the chemical and biological processes of soil formation. These factors combine to make a site on which plants compete well in droughty conditions. Because of the competition for limited water, plant communities are open—in other words, the individual plants are widely spaced. Because the plant cover is not dense, soils on these slopes have less protection from movement of surface material downslope by water and gravity. Soils in this survey area on south aspects commonly are shallower and less developed than soils on more sheltered slopes.

On north aspects, the temperatures are lower and the soils stay moist longer in the summer. Sufficient moisture is available to support dense plant communities and to aid in the weathering processes. The plant communities help to stabilize the surface of the soil. The deepening of the soil resulting from the weathering of bedrock or because of surface additions is greater than the amount of material that is removed by surface movement.

Soil formation on east aspects is similar to that on north aspects, and soil formation on west aspects is similar to that on south aspects. The relationships of aspect and soil formation are altered by proximity to high ridges that partially shelter the soils from sunlight.

Several associations mapped in this survey area are combinations of soils on opposing aspects that occur in repeating patterns. An example is Pardaloe-Dedrick association, 50 to 75 percent slopes. Both Pardaloe and Dedrick soils are Typic Xerochrepts. The Pardaloe soil is on the north, or sheltered, slopes. It is more than 60 inches deep over bedrock and has a mesic soil temperature regime. The Dedrick soil is on the south, or exposed, slopes. It is 10 to 20 inches deep over bedrock and has a thermic soil temperature regime. Both soils are in a loamy-skeletal family.

In other areas these relationships are complicated by variations in the bedrock. Soils that formed on decomposed granitic rocks are examples. The inherent erodibility of this material gives rise to landscapes that are densely dissected by drainageways. These dissections form many short, convex slopes on various aspects. Generally, as with other soils on south-facing slopes, the soils on south-facing slopes in these areas are less developed and are shallower than soils on other aspects, but the depth to bedrock on each aspect is variable because of the dissected landscapes. Some of the soils have been mapped as complexes because they occur in such intricate patterns. Tallowbox-Minersville complex, 50 to 75 percent slopes, is an example. The Tallowbox soil is primarily on south- and west-facing (or exposed) slopes and is 20 to 40 inches deep to weathered granitic rock. Plant communities on the Tallowbox soil are open and consist of plants that compete well on droughty sites. The Minersville soil is on north- and east-facing (or sheltered) slopes and is 40 to 60 inches deep. Plant communities on the Minersville soil are more dense than on the Tallowbox soil. Both soils are Typic Xerochrepts, and both have a mesic soil temperature regime.

### Climate

In addition to its relationship to aspect, climate varies depending on the elevation. Soil formation is influenced by variations in temperature and moisture. The climate is basically the same throughout most of the survey area. In general, however, precipitation increases with increasing elevation and soil temperature decreases. In some areas, such as Shoemaker Bally, at elevations above 4,500 feet on north aspects, soils have a frigid temperature regime and receive more than 65 inches of precipitation. Soil formation is slow, and the soils have a thick surface layer and an accumulation of organic matter on the surface. Minersville Variant soils (Entic Xerumbrepts) are examples. Organic matter has accumulated but is decaying very slowly because of the cold temperatures. An umbric epipedon results from a thick, dark surface horizon that is highly leached by high precipitation moving through the coarse textured soil. These soils are 20 to 40 inches deep to weathered granitic rock.

At the lower elevations of the survey area, soils on sparsely vegetated, south aspects have a thermic temperature regime. Also, soils in the area surrounding Blanchard Flat have a thermic temperature regime.

### Time

Soil formation begins when the geologic material is exposed to weathering. The influences of time on the formation of the soils in the survey area are described in the sections "Geology, Geomorphology, and Parent Material" and "Topography."

## Processes of Soil Formation

Following the building up of mountains, or the uplifting and folding of the earth's surface, mechanical and chemical weathering of exposed bedrock produces a layer of loose broken rock material (Bloom, 1969). On steep slopes, this material is intermittently moved downhill by gravity and water. It can be moved very short distances or long distances to the bottom of the

slope or into a steep drainageway. At times the material involved in this movement is shallow, and the movement may be very minor for many years. During these less active times, mechanical and chemical weathering reduces the size of the rock fragments and wears down the exterior of each fragment.

This early stage of weathering is altered by the colonization of the area with plants. As more and larger plants become established, the surface movement of rock fragments and soil material is decreased. The decaying plant material on the surface and the plant roots help to stabilize the material. At times the moving material is stopped by fallen logs or branches. This material then weathers on the surface and is mixed with adjacent organic material, such as logs or branches, and with the underlying rock material. It is continually covered with leaves, needles, and other organic material. The bedrock below is concurrently undergoing mechanical and chemical weathering. The soil is deepening as weathering proceeds downward through the bedrock and also slightly as a result of surface additions (Maser and Trappe, 1984).

Once surface movement has decreased, internal soil development leads to horizon development. Horizons are recognizable layers in the soil. They indicate stages in soil development. The presence and thickness of these horizons are used to classify soils.

Accumulations of organic material mixed with weathered material and rock fragments form the A horizon at the surface. This horizon hosts many micro-organisms that process organic material and produce plant-available nutrients. The organic material also holds nutrients and water for uptake by plant roots. The formation of the A horizon enhances the colonization of the area with plants. Some mixing of surface material occurs when animals burrow through it or when trees are uprooted by the wind.

The B horizon forms below the surface horizon. The weakest kind of B horizon in this survey area is one in which the weathered rock material below the A horizon forms aggregates, or peds. At first the soil particles aggregate around certain chemical compounds. The material shrinks and swells because of wetting and drying or freezing and thawing. Plant roots push the material. Eventually, defined aggregates are visible and soil structure is present. This stage of development is common in soils on active mountain slopes because the active movement of material downslope is mostly confined to a thin layer on the surface. Soil structure in the B horizon may be accompanied by redder colors or slight clay accumulations. This type of B horizon is known as a cambic horizon.

Over time, rainwater and snowmelt move downward through the soil carrying compounds from decaying organic materials and from weathering rock fragments. As soil particles and rock fragments weather, clay minerals are formed. These microscopic particles are carried in suspension by water moving downward through the soil. They are removed from the upper part of the soil and then deposited in the lower part where the water stops moving downward or where the soil pore size is too small for the particles to move through. An examination of the zone where clay particles accumulate enhances the understanding of how the soil-forming factors have interacted. This zone of clay accumulation is a common kind of B horizon in the survey area. Soils that have a thick, pronounced zone of clay accumulation (argillic horizon) generally indicate sites where soil development has been progressing for a long period of time, where the type of parent material is easily weathered, or where temperature and moisture conditions are optimum for clay weathering and translocation.

The amount of time that the soil-forming factors have been interacting is evidenced by the degree of soil development. Soils that have a well developed argillic horizon have been undergoing soil formation for long periods of time and hence have a relatively stable profile. This is true even on some slopes that are considered geologically active. The active portion of the slope may not influence the lower portions of the soil profile. Slope activity may be confined to a thin surface zone (Balster and Parsons, 1968).

Because the bedrock is continually weathering downward during soil formation, the soil that can be observed today has developed partly from residual rock weathering in place and partly from surface additions of material that originated in locations various distances upslope. Surface additions are more important during the earlier stages of soil development. After surface movement slows following plant colonization, a significant degree of soil deepening results from the weathering of rock in place. Evidence of this deepening is the presence of increasing amounts of weathered rock fragments at the lower depths in the soil. These rock fragments may be so abundant in the lower part of the profile that they grade into broken bedrock. Thus the lower portion of the soil is related to the bedrock and is forming in material weathered from it. In soils that have an argillic horizon, the presence of clay films throughout the profile is also evidence of this deepening. In well developed soils these clay films not only extend to bedrock but also line fractures in the bedrock itself. During the formation of these strongly developed argillic horizons, bedrock weathering continued and the soil was deepening as the

weathering zone advanced downward. These soils also show gradual increases in the content of rock fragments with increasing depth.

Although many mountain slopes are still geologically active, much of the material is moving intermittently in a thin mantle on the surface or is concentrated in drainageways that remove the material from the slope. The movement is influenced by local topography and by how well drainage patterns are developed (Hewlett and Nutter, 1969; Morisawa, 1968).

Occasionally major mass movement events alter large areas. In the areas that lose material, soil formation may be set back to very early stages. These areas consist of broken, weathered rock material with some clay formation and have some organic material mixed in near the surface. The areas that gain material downslope are deepened dramatically. This increased depth increases the ability of these areas to hold water and support plants, which helps to stabilize the surface and promote soil development. The soils in these areas commonly are very deep and are strongly developed if sufficient time has elapsed since the event.

Changes in surface stability, such as removal of organic matter by fire or disturbances by heavy machinery, reactivate movement of surface rock material. Disturbances by passage of wildlife, livestock, or humans can also reactivate surface movement on a small scale.

# References

Adams, Paul W., and Henry A. Froehlich. 1981. Compaction of forest soils. Pacific Northwest Extension, PNW 217.

Albright, Delmer L. 1980. An evaluation of the FMC tracked skidder on Jackson State Forest. California Department of Forestry Note 79.

American Association of State Highway and Transportation Officials (AASHTO). 1986. Standard specifications for highway materials and methods of sampling and testing. 14th edition, 2 volumes.

American Geological Institute. 1976. Dictionary of geological terms. Revised edition.

American Society for Testing and Materials (ASTM). 1993. Standard classification of soils for engineering purposes. ASTM Standard D 2487.

Balster, C.A., and R.B. Parsons. 1966. A soil-geomorphic study in the Oregon Coast Range. Oregon State University Agricultural Experiment Station Technical Bulletin 89.

Balster, C.A., and R.B. Parsons. 1968. Sediment transportation on steep terrain, Oregon Coast Range. Northwest Science 42(2): 62-70.

Barbour, Michael G., and Jack Major, editors. 1977. Terrestrial vegetation of California. Pages 417-469.

Berry, Donald L. 1983. An assessment of the potential for sheet and rill erosion on disturbed forest land. Mendocino County Resource Conservation District and U.S. Department of Agriculture, Soil Conservation Service.

Bloom, Arthur L. 1969. The surface of the earth.

Brown, George W. 1974. Forestry and water quality.

Burcham, L.T. 1957. California range land. California Department of Natural Resources, Division of Forestry.

Burroughs, Edward R., Jr., and others. 1976. Slope stability in road construction—A guide to the construction of stable roads in western Oregon and northern California. U.S. Department of the Interior, Bureau of Land Management.

California Department of Forestry. 1980. Markets for woodland products in California.

Chesterman, Charles W. 1978. The Audubon Society field guide to North American rocks and minerals.

Crampton, Beecher. 1974. Grasses in California. California Natural History Guide 33.

Davis, Gregory A. 1966. Metamorphic and granitic history of the Klamath Mountains. *In* Geology of Northern California, pages 39-50. California Division of Mines and Geology.

Davis, Kenneth P. 1959. Forest fire: Control and use.

Dayton, W.A. 1937. Range plant handbook. U.S. Department of Agriculture, Forest Service.

DeGarmo, Harlan, compiler. 1980. California list of scientific and common plant names. U.S. Department of Agriculture, Soil Conservation Service.

Gelderman, F.W., and R.B. Parsons. 1972. Argixerolls on late Pleistocene surfaces in northwestern Oregon. Soil Science Society of America Proceedings 36: 335-341.

Green, Lisle R. 1977. Fuelbreaks and other fuel modifications for wildland fire control. U.S. Department of Agriculture, Forest Service, Agriculture Handbook 499.

Green, Lisle R. 1981. Burning by prescription in chaparral. U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station General Technical Report PSW-51.

Green, Lisle R. 1982a. Prescribed burning in the California Mediterranean ecosystem. *In* Proceedings of the Symposium on Dynamics and Management of Mediterranean-Type Ecosystems, page 464. U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station General Technical Report PSW-58.

Green, Lisle R. 1982b. Using goats to control brush regrowth on fuelbreaks. U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station General Technical Report PSW-59.

Grenfell, William E., and others. 1980. Food habits of the California upland game birds. State of California, The Resources Agency, Department of Fish and Game, Wildlife Management Branch Administrative Report 80-1.

Hausenbuiller, R.L. 1974. Soil science: Principles and practices.

Heilman, Paul E., and others, compilers and editors. 1981. Forest soils of the Douglas-fir region. Washington State University Cooperative Extension Service.

Hewlett, John D., and Wade L. Nutter. 1969. An outline of forest hydrology.

Hillel, Daniel. 1971. Soil and water: Physical principles and processes.

Hitchcock, A.S. 1951. Manual of the grasses of the United States. Second edition. U.S. Department of Agriculture Miscellaneous Publication 200.

Hobbs, S.D., and O.T. Helgerson, editors. 1981. Reforestation of skeletal soils.

Irwin, William P. 1966. Geology of the Klamath Mountains Province. *In* Geology of Northern California, pages 19-37. California Division of Mines and Geology.

Irwin, William P. 1986. Age and tectonics of plutonic belts in accreted terranes of the Klamath Mountains, California and Oregon. Tectonostratigraphy Terranes, Pacific Northeast Quadrant, pages 187-199.

Jepson, W.L. 1960. A manual of the flowering plants of California.

Jones, Alice Geon, editor. 1981. Trinity County historic sites.

Laacke, Robert J., compiler. 1979. California forest soils—A guide for professional foresters and resource managers and planners.

Lewis, Henry T. 1974. Patterns of Indian burning in California: Ecology and ethnohistory. Ballena Press Anthropological Papers, no. 1.

Martin, R.E., and J.D. Dell. 1978. Planning for prescribed burning in the inland Northwest. U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station General Technical Report PNW-76.

Martin, R.E., and others. 1979. Effects of fire on fuels—A state-of-knowledge review. U.S. Department of Agriculture, Forest Service, General Technical Report WO-13.

Maser, Chris, and James M. Trappe, editors. 1984. The seen and unseen world of the fallen tree. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-164.

Matsch, Charles L. 1976. North America and the great ice age.

McArdle, Richard E., and Walter H. Meyer. 1961. The yield of Douglas-fir in the Pacific Northwest. U.S. Department of Agriculture Technical Bulletin 201.

McMinn, Howard E. 1974. An illustrated manual of California shrubs.

McNabb, D.H., and R.G. Campbell. 1985. Quantifying the impacts of forestry activities on soil productivity. Proceedings of the 1985 National Convention, Society of American Foresters, pages 116-120.

McNabb, D.H., and H.A. Froehlich. 1983. Conceptual model for predicting forest productivity losses from soil compaction. Proceedings of the 1983 National Convention, Society of American Foresters, pages 261-265.

Meyer, Walter H. 1938. Yield of even-aged stands of ponderosa pine. U.S. Department of Agriculture Technical Bulletin 630.

Miller, Howard, and Samuel Lamb. 1985. Oaks of North America.

Morisawa, Marie. 1968. Streams: Their dynamics and morphology.

Munns, E.N. 1920. Chaparral cover, runoff, and erosion. Journal of Forestry 18: 806-814.

Munz, P.A., and D.D. Keck. 1975. A California flora and supplement.

Noste, N.V. 1985. Influence of fire severity on response of evergreen ceanothus. *In* Fire's Effects on Wildlife Habitat, pages 91-96. U.S. Department of Agriculture, Forest Service, Intermountain Research Station General Technical Report INT-186.

Parsons, R.B., and R.C. Herriman. 1970. Haploxerolls and Argixerolls developed in recent alluvium, southern Willamette Valley, Oregon. Soil Science 109(5): 299-309.

Parsons, R.B., and others. 1973. Geomorphic occurrence of Pelloxererts, Willamette Valley, Oregon. Soil Science Society of America Proceedings 37: 924-927, November-December.

Pritchett, William L. 1979. Properties and management of forest soils.

Randall, Warren R., and others. 1981. Manual of Oregon trees and shrubs.

Satterlund, Donald R. 1972. Wildland watershed management.

Schumacher, Francis X. 1926. Yield, stand, and volume tables for white fir in the California pine region. U.S. Department of Agriculture Technical Bulletin 407.

Sharp, Robert P. 1960. Glaciers.

Strothmann, R.O., and Douglass F. Roy. 1984. Regeneration of Douglas-fir in the Klamath Mountains region, California and Oregon. U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station.

Sudworth, George B. 1967. Forest trees of the Pacific Slope.

United States Department of Agriculture. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conservation Service, U.S. Department of Agriculture Handbook 436.

United States Department of Agriculture. 1993. Soil survey manual. U.S. Department of Agriculture Handbook 18.

Vogl, Richard J. 1982. Chaparral succession. *In* Proceedings of the Symposium on Dynamics and Management of Mediterranean-Type Ecosystems, pages 81-85. U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station General Technical Report PSW-58.

Welling, R., and others. 1984. Effects of fire on shrubland soils. *In* Shrublands in California: Literature Review and Research Needs for Management, Chapter 4. University of California, Water Resources Center, Contribution no. 191.

Wensel, L.C., and G.S. Beging. 1985. California conifer timber output simulator. Northern California Forest Yield Cooperative.

# Glossary

**Active slope.** A hill or mountain slope that is responding to valley incision, with erosion (either geologic or accelerated) exceeding regolith weathering, and that has detritus accumulated behind obstructions indicating contemporary transport of slope alluvium or colluvium.

**Aeration, soil.** The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

**Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

**Alluvial fan.** The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

**Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.

**Animal unit month (AUM).** The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

**Area reclaim** (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

**Association, soil.** A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

**Available water capacity (available moisture capacity).** The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

| | |
|---|---|
| Very low | 0 to 2.5 |
| Low | 2.5 to 5.0 |
| Moderate | 5.0 to 7.5 |
| High | 7.5 to 10.0 |
| Very high | more than 10.0 |

**Basal area.** The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

**Base saturation.** The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

**Batholith.** A body of intrusive rock at least 40 square miles in area.

**Bedding planes.** Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

**Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

**Bisequum.** Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

**Bottom land.** The normal flood plain of a stream, subject to flooding.

**Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.

**Breaks.** The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

**Breast height.** An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

**Buffer strips.** Areas of intact, undisturbed vegetation and ground cover left along streams and ephemeral drainageways to slow surface runoff and to filter sediment.

**Cable yarding.** A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees

generally are reeled in while one end is lifted or the entire log is suspended.

**CACTOS.** California Conifer Timber Output Simulator. (See "Woodland Management and Productivity.")

**California bearing ratio** (CBR). The load-supporting capacity of a soil as compared to that of a standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

**Canopy.** The leafy crown of trees or shrubs. (See Crown.)

**Canyon.** A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

**Capillary water.** Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

**Catena.** A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

**Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

**Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

**Catsteps.** Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

**Cement rock.** Shaly limestone used in the manufacture of cement.

**Channery soil.** A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

**Chemical treatment.** Control of unwanted vegetation through the use of chemicals.

**Chiseling.** Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage used to control wind erosion.

**Cirque.** A semicircular, concave, bowl-like area that has steep faces primarily resulting from glacial ice and snow abrasion.

**Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

**Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

**Claypan.** A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

**Climax plant community.** The plant community on a given site that will be established if present environmental conditions continue to prevail and the site is properly managed.

**Coarse fragments.** Mineral or rock particles larger than 2 millimeters in diameter.

**Coarse textured soil.** Sand or loamy sand.

**Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

**Cobbly soil material.** Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.

**Colluvium.** Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

**Complex slope.** Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

**Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

**Concretions.** Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

**Congeliturbate.** Soil material disturbed by frost action.

**Conglomerate.** A coarse grained, clastic rock composed of rounded to subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer material. Conglomerate is the consolidated equivalent of

gravel and may contain fragments more than 3 inches in diameter.

**Conservation cropping system.** Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

**Consistence, soil.** The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

*Loose.*—Noncoherent when dry or moist; does not hold together in a mass.

*Friable.*—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

*Firm.*—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

*Plastic.*—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

*Sticky.*—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

*Hard.*—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

*Soft.*—When dry, breaks into powder or individual grains under very slight pressure.

*Cemented.*—Hard; little affected by moistening.

**Contour stripcropping (or contour farming).** Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

**Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

**Corrosive.** High risk of corrosion to uncoated steel or deterioration of concrete.

**Cover crop.** A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

**Creep.** Slow mass movement of earth material down relatively steep slopes, primarily under influence of gravity but facilitated by saturation with water and by frost action.

**Cropping system.** Growing crops according to a planned system of rotation and management practices.

**Crop residue management.** Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

**Cross-slope farming.** Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

**Crown.** The upper part of a tree or shrub, including the living branches and their foliage.

**Culmination of the mean annual increment (CMAI).** The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

**Cutbanks cave** (in tables). The walls of excavations tend to cave in or slough.

**Decreasers.** The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

**Deferred grazing.** Postponing grazing or resting grazing land for a prescribed period.

**Delta.** A body of alluvium having a surface that is nearly flat and fan shaped, deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

**Depth to rock** (in tables). Bedrock is too near the surface for the specified use.

**Detritus.** Rock and mineral fragments occurring in sediments that were derived from pre-existing igneous, sedimentary, or metamorphic rocks and moved from their place of origin.

**Dip slope.** A slope of the land surface, roughly determined by and approximately conforming with the dip of underlying bedded rock.

**Diversion (or diversion terrace).** A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

**Drainage class** (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused

by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

*Excessively drained.*—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

*Somewhat excessively drained.*—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.

*Well drained.*—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

*Moderately well drained.*—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

*Somewhat poorly drained.*—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

*Poorly drained.*—These soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

*Very poorly drained.*—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except for rice) unless a drainage system is installed.

**Drainage, surface.** Runoff, or surface flow of water, from an area.

**Draw.** A small stream valley, generally more open and with broader bottom land than a ravine or gulch.

**Duff.** A term used to identify a generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

**Eluviation.** The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

**Eolian soil material.** Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

**Ephemeral stream.** A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

**Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

*Erosion* (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

*Erosion* (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

**Erosion pavement.** A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

**Escarpment.** A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

**Excess fines** (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

**Extrusive rock.** Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

**Fallow.** Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

**Fan terrace.** A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

**Fast intake** (in tables). The rapid movement of water into the soil.

**Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when

light, moisture, temperature, tilth, and other growth factors are favorable.

**Fibric soil material (peat).** The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

**Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

**Fill slope.** A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

**Filter strips.** Mounds of woody material placed along the downslope margin of disturbed areas to filter sediment from surface runoff. Commonly, logging slash or vegetation removed during road building is used to keep sediment from reaching streams.

**Fine textured soil.** Sandy clay, silty clay, or clay.

**Firebreak.** Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

**First bottom.** The normal flood plain of a stream, subject to frequent or occasional flooding.

**Flaggy soil material.** Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material is 35 to 60 percent flagstones, and extremely flaggy soil material is more than 60 percent flagstones.

**Flagstone.** A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

**Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

**Fluvial.** Of or pertaining to rivers; produced by river action, as a fluvial plain.

**Foothill.** A steeply sloping upland that has relief of as much as 1,000 feet (or 300 meters) and fringes a mountain range or high-plateau escarpment.

**Foot slope.** The inclined surface at the base of a hill.

**Forb.** Any herbaceous plant not a grass or a sedge.

**Forest cover.** All trees and other woody plants (underbrush) covering the ground in a forest.

**Forest type.** A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

**Fragipan.** A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

**Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

**Gilgai.** Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

**Glacial drift** (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

**Glacial outwash** (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

**Glacial till** (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

**Glaciofluvial deposits** (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

**Glaciolacustrine deposits.** Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

**Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

**Graded stripcropping.** Growing crops in strips that grade toward a protected waterway.

**Grassed waterway.** A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

**Gravel.** Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

**Gravelly soil material.** Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

**Green manure crop** (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

**Ground water** (geology). Water filling all the unblocked pores of underlying material below the water table.

**Gully.** A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

**Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

**Hardpan.** A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

**Head out.** To form a flower head.

**Hemic soil material (mucky peat).** Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

**High-residue crops.** Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

**Hill.** A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

**Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

*O horizon.*—An organic layer of fresh and decaying plant residue.

*A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

*E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

*B horizon.*—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

*C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

*Cr horizon.*—Soft, consolidated bedrock beneath the soil.

*R layer.*—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

**Humus.** The well decomposed, more or less stable part of the organic matter in mineral soils.

**Hydrologic soil groups.** Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

**Igneous rock.** Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

**Illuviation.** The movement of soil material from one horizon to another in the soil profile. Generally,

material is removed from an upper horizon and deposited in a lower horizon.

**Impervious soil.** A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

**Increasers.** Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

**Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Infiltration capacity.** The maximum rate at which water can infiltrate into a soil under a given set of conditions.

**Infiltration rate.** The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

**Intake rate.** The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

| | |
|---|---|
| Less than 0.2 | very low |
| 0.2 to 0.4 | low |
| 0.4 to 0.75 | moderately low |
| 0.75 to 1.25 | moderate |
| 1.25 to 1.75 | moderately high |
| 1.75 to 2.5 | high |
| More than 2.5 | very high |

**Intermittent stream.** A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**Invaders.** On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

**Irrigation.** Application of water to soils to assist in production of crops. Methods of irrigation are:
*Basin.*—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
*Border.*—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
*Controlled flooding.*—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
*Corrugation.*—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.
*Drip (or trickle).*—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
*Furrow.*—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
*Sprinkler.*—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
*Subirrigation.*—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
*Wild flooding.*—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Knoll.** A small, low, rounded hill rising above adjacent landforms.

**Lacustrine deposit** (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Landslide.** The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

**Large stones** (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Light textured soil.** Sand or loamy sand.

**Liquid limit.** The moisture content at which the soil passes from a plastic to a liquid state.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loess.** Fine grained material, dominantly of silt-sized particles, deposited by wind.

**Low-residue crops.** Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

**Low strength.** The soil is not strong enough to support loads.

**Mass wasting.** Dislodgement and downslope transport of earth material as a unit under direct gravitational stress. The process includes slow

displacements, such as creep, and rapid movements, such as landslides.

**Mechanical treatment.** Use of mechanical equipment for seeding, brush management, and other management practices.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

**Metastable slope.** A slope that is relatively stable at the present time but may become active if the environmental balance is disturbed, for instance, by road construction or destruction of vegetation.

**Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

**Minimum tillage.** Only the tillage essential to crop production and prevention of soil damage.

**Miscellaneous area.** An area that has little or no natural soil and supports little or no vegetation.

**Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.

**Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.

**Moraine** (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

**Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

**Mottling, soil.** Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

**Mountain.** A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides and a surface of considerably bare rock. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

**Mudstone.** Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

**Munsell notation.** A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

**Neutral soil.** A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

**Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Observed rooting depth.** Depth to which roots have been observed to penetrate.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition.

**Pan.** A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

**Parent material.** The unconsolidated organic and mineral material in which soil forms.

**Pebble.** An individual gravel-sized rock fragment. (See Gravel.)

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedon.** The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation.** The movement of water through the soil.

**Percs slowly** (in tables). The slow movement of water through the soil, adversely affecting the specified use.

**Permafrost.** Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

**Permeability.** The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

| | |
|---|---|
| Very slow | less than 0.06 inch |
| Slow | 0.06 to 0.2 inch |
| Moderately slow | 0.2 to 0.6 inch |
| Moderate | 0.6 inch to 2.0 inches |
| Moderately rapid | 2.0 to 6.0 inches |
| Rapid | 6.0 to 20 inches |
| Very rapid | more than 20 inches |

**Phase, soil.** A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Piping** (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Plasticity index.** The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

**Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.

**Plateau.** An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

**Plinthite.** The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

**Plowpan.** A compacted layer formed in the soil directly below the plowed layer.

**Pluton.** A body of igneous rock that has formed below the surface of the earth by consolidation of magma.

**Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poor filter** (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

**Poorly graded.** Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

**Potential native plant community.** See Climax plant community.

**Potential rooting depth (effective rooting depth).** Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

**Prescribed burning.** The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

**Productivity, soil.** The capability of a soil for producing a specified plant or sequence of plants under specific management.

**Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.

**Proper grazing use.** Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

**Range condition.** The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

**Rangeland.** Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

**Range site.** An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

**Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

| | |
|---|---|
| Extremely acid | below 4.5 |
| Very strongly acid | 4.5 to 5.0 |
| Strongly acid | 5.1 to 5.5 |
| Moderately acid | 5.6 to 6.0 |
| Slightly acid | 6.1 to 6.5 |
| Neutral | 6.6 to 7.3 |
| Mildly alkaline | 7.4 to 7.8 |
| Moderately alkaline | 7.9 to 8.4 |
| Strongly alkaline | 8.5 to 9.0 |
| Very strongly alkaline | 9.1 and higher |

**Regolith.** The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose

earth material above the solid rock.

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Residuum (residual soil material).** Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**Rill.** A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

**Road cut.** A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Rolling dip.** A smooth, shallow dip or depression in a roadway that is constructed at an angle across the road. It is constructed to slow the downward velocity of water and to divert the water off the road surface into a controlled discharge. Rolling dips can easily be driven over.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

**Saline soil.** A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

**Sand.** As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sandstone.** Sedimentary rock containing dominantly sand-sized particles.

**Sapric soil material (muck).** The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

**Saprolite** (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

**Scarification.** The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

**Sedimentary rock.** Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

**Seepage** (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

**Sequum.** A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Shale.** Sedimentary rock formed by the hardening of a clay deposit.

**Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Shrink-swell** (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Silica.** A combination of silicon and oxygen. The mineral form is called quartz.

**Silica-sesquioxide ratio.** The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Siltstone.** Sedimentary rock made up of dominantly silt-sized particles.

**Site class.** A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

**Site curve (50-year).** A set of related curves on a graph that shows the average height of dominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant trees that are 50 years old or are 50 years old at breast height.

**Site curve (100-year).** A set of related curves on a

graph that shows the average height of dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant and codominant trees that are 100 years old or are 100 years old at breast height.

**Site index.** A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

**Slickensides.** Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

| | |
|---|---|
| Nearly level | 0 to 2 percent |
| Gently sloping | 2 to 5 percent |
| Moderately sloping | 5 to 9 percent |
| Strongly sloping | 9 to 15 percent |
| Moderately steep | 15 to 30 percent |
| Steep | 30 to 50 percent |
| Very steep | 50 to 75 percent |
| Extremely steep | more than 75 percent |

**Slope** (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

**Small stones** (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

**Soft bedrock.** Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

**Soil separates.** Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

| | |
|---|---|
| Very coarse sand | 2.0 to 1.0 |
| Coarse sand | 1.0 to 0.5 |
| Medium sand | 0.5 to 0.25 |
| Fine sand | 0.25 to 0.10 |
| Very fine sand | 0.10 to 0.05 |
| Silt | 0.05 to 0.002 |
| Clay | less than 0.002 |

**Solum.** The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

**Spur ridge.** A secondary divide between minor drainage systems of an area. It generally has a "v" shape and occurs considerably below the elevation of the associated ridge.

**Stone line.** A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 6 to 15 inches (15 to 38 centimeters) in length if flat.

**Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**Stripcropping.** Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

**Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Stubble mulch.** Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Subsoiling.** Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Technically, the E horizon. Generally

refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

**Summer fallow.** The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

**Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

**Tailwater.** The water just downstream of a structure.

**Talus.** Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep, rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

**Taxadjuncts.** Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

**Terminal moraine.** A belt of thick glacial drift that generally marks the termination of important glacial advances.

**Terrace.** An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

**Terrace** (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

**Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

**Thin layer** (in tables). Otherwise suitable soil material too thin for the specified use.

**Tilth, soil.** The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

**Toe slope.** The outermost inclined surface at the base of a hill; part of a foot slope.

**Topsoil.** The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

**Trace elements.** Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

**Type conversion.** The conversion of one type of vegetation to another, such as from brush-covered lands to grass for grazing.

**Upland** (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Valley fill.** In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

**Variant, soil.** A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

**Variegation.** Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

**Varve.** A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

**Water bars.** Smooth, short mounds that are constructed at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface to a protected discharge. Water bars can be driven over, but they can be easily damaged, especially when the road is wet.

**Watershed land.** Areas where the soil supports only brush, grass, or scattered hardwoods and conifers because of inherent soil or site characteristics.

**Weathering.** All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

**Well graded.** Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and

bearing properties by compaction. Contrasts with poorly graded soil.

**Wilting point (or permanent wilting point).** The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

**Windrowing.** The practice of brush clearing or site preparation using a bulldozer with a blade or brush rake implement and stacking the material in piles called windrows. The piles contain brush and organic material with varying amounts of topsoil.

**Windthrow.** The uprooting and tipping over of trees by the wind.

# Appendixes

*Appendix A* is an excerpt from California supplement CA-4 to the National Conservation Planning Manual, dated February 1981, United States Department of Agriculture, Soil Conservation Service.

*Appendix B* is an edited version of the ratings guide described in the National Soils Handbook, Part 603, dated September 22, 1983, United States Department of Agriculture, Soil Conservation Service. These guides provided the basis for the interpretive ratings given in the tables Recreational development, Building site development, Sanitary facilities, Construction materials, and Water management. Soils are rated for the uses expected to be important or potentially important to users of soil survey information. Ratings for proposed uses are given in terms of limitations and restrictive features. Only the most restrictive features are listed in the tables. Therefore, if a soil is rated severe, only those soil features that cause the soil to be rated severe are given. There may be other limitations that should be overcome if the soil is to be used for a specific purpose. The guides in appendix B show in the first column the properties or features used as criteria for rating the soil for the use. The properties are listed in descending order of estimated importance. In the "Limits" column, limits of the properties are given for rating the soils and for recognizing a restrictive property or properties. In the "Restrictive feature" column, a key phrase indicates the feature causing the problem.

# Appendix A

## Prime Farmlands

Prime Farmland is land best suited for producing food, feed, forage, fiber, and oilseed crops and also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land but not urban builtup land or water). It has the soil quality, growing season and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modern farming methods.

Prime Farmland meets all the following criteria:

1. The soils have:

A. Aquic, udic, ustic, or xeric moisture regimes and an available water capacity of at least 4 inches (10 cm) per 40 to 60 inches (1 to 1.52 meters) of soil to produce the commonly grown cultivated crops (cultivated crops include, but are not limited to, grain, forage, fiber, oilseed, sugarbeets, vegetables, orchard, vineyard, and bush fruit crops) adapted to the region in 7 or more years out of 10; or

B. Xeric, ustic, aridic, or torric moisture regimes in which the available water capacity is at least 4 inches (10 cm) per 40 to 60 inches (1 to 1.52 meters) of soil and the area has a developed irrigation water supply that is dependable (a dependable water supply is one in which enough water is available for irrigation in 8 out of 10 years for the crops commonly grown) and of adequate quality; and,

2. The soils have a temperature regime that is frigid, mesic, thermic or hyperthermic (pergelic and cryic regimes are excluded). These are soils that, at a depth of 20 inches (50 cm), have a mean annual temperature higher than 32° F (0° C). In addition, the mean summer temperature at this depth in soils with an O horizon is higher than 47° F (8° C); in soils that have no O horizon, the mean summer temperature is higher than 59° F (15° C); and,

3. The soils have a pH between 4.5 and 8.4 in all horizons within a depth of 40 inches (1 meter); and,

4. The soils either have no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow cultivated crops common to the area to be grown; and,

5. The soils can be managed so that, in all horizons within a depth of 40 inches (1 meter), during part of each year the conductivity of the saturation extract is less than 4 mmhos/cm and the exchangeable sodium percentage (ESP) is less than 15; and,

6. The soils are not flooded frequently during the growing season (less often than once in 2 years); and,

7. The product of K (erodibility factor) x percent slope is less than 2.0; and,

8. The soils have a permeability rate of at least 0.06 inch (0.15 cm) per hour in the upper 20 inches (50 cm) and the mean annual soil temperature at a depth of 20 inches (50 cm) is less than 59° F (15° C); the permeability rate is not a limiting factor if the mean annual soil temperature is 59° F (15° C) or higher; and,

9. Less than 10 percent of the surface layer [upper 6 inches (15 cm)] in these soils consists of rock fragments coarser than 3 inches (7.6 cm); and,

10. The soils have a minimum rooting depth of 40 inches (1 meter).

# Appendix B.—Criteria Used in Rating Soils for Selected Uses

## Camp Areas

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Flooding | None | --- | Rare, common. | Flooding. |
| 3. Slope (percent) | <8 | 8-15 | >15 | Slope. |
| 4. USDA texture modifier (surface layer) | --- | STV, BYV, CB, FL | STX, BYX, CBX, FLX, CBV, FLV, CNX, CRX, SHX, SYX | Large stones. |
| 5. Coarse fragments in the surface layer (percent) [1] | <25 | 25-50 | >50 | Small stones. |
| 6. Depth to high water table (feet) | ---<br>>2.5 | ---<br>1.5-2.5 | +<br><1.5 | Ponding.<br>Wetness. |
| 7. Permeability in the upper 40 inches (in/hr) [2] | >0.6 | 0.06-0.6 | <0.06 | Percs slowly. |
| 8. USDA texture (surface layer) [2] | --- | --- | SC, SIC, C | Too clayey. |
| 9. Unified (surface layer) | --- | --- | PT | Excess humus. |
| 10. USDA texture (surface layer) | --- | LCOS, VFS, LFS, [3] LS [3] | COS, S, FS | Too sandy. |
| 11. Depth to bedrock (inches) | --- | --- | <20 | Depth to rock. |
| 12. Depth to cemented pan (inches) | --- | --- | <20 | Cemented pan. |
| 13. USDA texture (surface layer) [4] | --- | SIL, SI, VFSL, L | --- | Dusty. |
| 14. Sodium adsorption ratio in the upper 40 inches (great group) | --- | --- | >12 (natric, halic, alkali phases) | Excess sodium. |
| 15. Salinity (mmhos/cm) (surface layer) | <4 | 4-8 | >8 | Excess salt. |
| 16. Soil reaction (surface layer) | --- | --- | <3.6 | Too acid. |
| 17. Other | --- | --- | ([5]) | Fragile. |

[1] 100 minus percent passing No. 10 sieve.
[2] Rate soils in UST, TOR, ARID, BOR, or XER suborders, great groups, or subgroups one class better.
[3] Rate *slight* if finer textured material is within 20 inches of the surface.
[4] Disregard unless soil is in TOR, ARID, or XER suborders, great groups, or subgroups.
[5] If the soil is easily damaged by use or disturbance, rate "Severe—fragile."

## Daily Cover for Landfill

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Good | Fair | Poor | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Depth to bedrock (inches) | >60 | 40-60 | <40 | Depth to rock. |
| 3. Depth to cemented pan (inches) | >60 | 40-60 | <40 | Cemented pan. |
| 4. Unified [1] | --- | --- | SP, SW, SP-SM, SW-SM, GP, GW, GP-GM, GW-GM | Seepage. |
| 5. USDA texture [1 2 3] | --- | CL, SICL, SC | SIC, C | Too clayey. |
| 6. USDA texture [1] | --- | LCOS, LS, LFS, VFS | S, FS, COS, SG | Too sandy. |
| 7. Unified [1 2] | --- | --- | OL, OH, CH, MH | Hard to pack. |
| 8. Coarse fragments (percent) [1 4] | <25 | 25-50 | >50 | Small stones. |
| 9. Fraction greater than 3 inches (percent by weight) [1 4] | <25 | 25-50 | >50 | Large stones. |
| 10. Slope (percent) | <8 | 8-15 | >15 | Slope. |
| 11. Depth to high water table (feet) | ---<br>>3.5 | ---<br>1.5-3.5 | +<br><1.5 | Ponding.<br>Wetness. |
| 12. Unified [1] | --- | --- | PT | Excess humus. |
| 13. Layer thickness (inches) | >60 | 40-60 | <40 | Thin layer. |
| 14. Soil reaction (pH) [1] | --- | --- | <3.6 | Too acid. |
| 15. Salinity in the upper 60 inches (mmhos/cm) [3] | --- | --- | >16 | Excess salt. |
| 16. Sodium adsorption ratio (great group) [1 3] | --- | --- | >12 (halic, natric, alkali phases) | Excess sodium. |
| 17. Carbonates | --- | --- | (5) | Excess lime. |

[1] Thickest layer between 10 and 60 inches.

[2] If in kaolinitic family, rate one class better if experience confirms.

[3] Disregard in all Aridisols except Salorthids and Aquic intergrades, all Aridic subgroups, and all Torri great groups of Entisols except Aquic.

[4] Sum (100 minus percent passing No. 10 sieve) and fraction greater than 3 inches. Use dominant condition for restrictive feature.

[5] If the amount of carbonate is so high that it restricts the growth of plants, rate "Poor—excess lime."

## Drainage

| Property | Limits | Restrictive feature [1] |
|---|---|---|
| 1. USDA texture | Ice | Permafrost. |
| 2. Depth to high water table (feet) [2] | >3 [3]<br>+ | Deep to water.<br>Ponding. |
| 3. Permeability in the upper 40 inches (inches/hour) | <0.2 | Percs slowly. |
| 4. Depth to bedrock (inches) | <40 | Depth to rock. |
| 5. Depth to cemented pan (inches) | <40 | Cemented pan. |
| 6. Flooding | Common | Flooding. |
| 7. Total subsidence | Any entry | Subsides. |
| 8. Fraction greater than 3 inches (percent by weight) [4] | >25 | Large stones. |
| 9. Potential frost action | High | Frost action. |
| 10. Slope (percent) | >3 | Slope. |
| 11. USDA texture [4] | COS, S, FS, VFS, LCOS, LS, LFS, LVFS, SG, G | Cutbanks cave. |
| 12. Salinity (mmhos/cm) (any depth) | >8 | Excess salt. |
| 13. Sodium adsorption ratio in the upper 40 inches (great group or phase) | >12<br>(natric, halic, alkali phases) | Excess sodium. |
| 14. Sulfidic materials (great group) | Sulfaquents, Sulfihemists | Excess sulfur. |
| 15. Soil reaction (pH) (any depth) | <3.6 | Too acid. |
| 16. Downslope movement | (5) | Slippage. |
| 17. Complex landscape | (6) | Complex slope. |
| 18. Availability of outlets | (7) | Poor outlets. |

[1] If the soil has no restrictive features, the rating is *favorable*.
[2] If "Deep to water," disregard other properties.
[3] If irrigated, consider other restrictive features if the water table is between 3 and 5 feet.
[4] Thickest layer between 10 and 60 inches.
[5] If the soil is susceptible to movement downslope when loaded, excavated, or wet, list "Slippage" as a restrictive feature.
[6] If complex and irregular slopes cause difficulty in design, installation, or functioning of the system, list "Complex slope" as a restrictive feature.
[7] If good outlets are difficult to find, list "Poor outlets" as a restrictive feature.

## Dwellings With Basements

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Flooding | None | --- | Rare, common. | Flooding. |
| 3. Depth to high water table (feet) | --- | --- | + | Ponding. |
| | >6 | 2.5-6 | <2.5 | Wetness. |
| 4. Depth to bedrock (inches): | | | | |
| Hard | >60 | 40-60 | <40 | Depth to rock. |
| Soft | >40 | 20-40 | <20 | Depth to rock. |
| 5. Depth to cemented pan (inches): | | | | |
| Thick | >60 | 40-60 | <40 | Cemented pan. |
| Thin | >40 | 20-40 | <20 | Cemented pan. |
| 6. Slope (percent) | <8 | 8-15 | >15 | Slope. |
| 7. Shrink-swell potential [1] | Low | Moderate | High, very high. | Shrink-swell. |
| 8. Unified (bottom layer) | --- | --- | OL, OH, PT | Low strength. |
| 9. Fraction greater than 3 inches (percent by weight) [2] | <25 | 25-50 | >50 | Large stones. |
| 10. Total subsidence | --- | --- | >12 | Subsides. |
| 11. Downslope movement | --- | --- | (3) | Slippage. |
| 12. Formation of pits | --- | --- | (4) | Pitting. |
| 13. Differential settling | --- | --- | (5) | Unstable fill. |

[1] Thickest layer between 10 and 60 inches.

[2] Weighted average to 40 inches.

[3] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate "Severe—slippage."

[4] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate "Severe—pitting."

[5] If the soil is susceptible to differential settling, rate "Severe—unstable fill."

## Embankments, Dikes, and Levees

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Layer thickness (inches) | >60 | 30-60 | <30 | Thin layer. |
| 3. Unified [1] | --- | --- | GW, GP, SW, SP, GW-GM, GP-GM, SW-SM, SP-SM, SM, [2] GM [2] | Seepage. |
| 4. Unified [1] | --- | GM, [3] CL [4] | ML, [5] SM, [6] SP, CL-ML | Piping. |
| 5. Unified [1] | --- | --- | PT, OL, OH | Excess humus. |
| 6. Unified [1] | --- | --- | MH, CH [7] | Hard to pack. |
| 7. Fraction greater than 3 inches (percent by weight) [8] | <15 | 15-35 | >35 | Large stones. |
| 8. Depth to high water table (feet) | --- | --- | + | Ponding. |
| Apparent | >4 | 2-4 | <2 | Wetness. |
| Perched | >3 | 1-3 | <1 | Wetness. |
| 9. Sodium adsorption ratio in the upper 40 inches (great group) | --- | --- | >12 (natric, halic, alkali phases) | Excess sodium. |
| 10. Salinity (any depth) (mmhos/cm) | <8 | 8-16 | >16 | Excess salt. |

[1] Thickest horizon between 10 and 60 inches.

[2] Rate *moderate* if more than 20 percent passing No. 200 sieve and *slight* if more than 30 percent passing No. 200 sieve.

[3] Rate *slight* if less than 35 percent passing No. 200 sieve, less than 50 percent passing No. 40 sieve, and less than 65 percent passing No. 10 sieve. The soil must meet all three criteria before it is rated *slight*.

[4] Rate *slight* if PI is greater than 15.

[5] Rate *moderate* of PI is greater than 10.

[6] Rate *moderate* if less than 70 percent passing No. 40 sieve and less than 90 percent passing No. 10 sieve, and rate *slight* if less than 60 percent passing No. 40 sieve and less than 75 percent passing No. 10 sieve.

[7] Rate *moderate* if PI is less than 40.

[8] Weighted average to 40 inches.

## Gravel

| Property | Limits | | Restrictive feature |
|---|---|---|---|
| | Probable source | Improbable source | |
| 1. USDA texture | --- | Ice | Permafrost. |
| 2. Unified [1] | GW, GP, GW-GM, GP-GM | --- | --- |
| | SW[2], SP[2], SW-SM[2], SP-SM [2] | SW[3], SP[3], SW-SM[3], SP-SM [3] | Too sandy. |
| | --- | PT | Excess humus. |
| | --- | All other | Excess fines. |
| 3. Layer thickness (inches) | --- | <36 | Thin layer. |
| | >36 | --- | --- |
| 4. Fraction greater than 3 inches (percent by weight) [4] | --- | >50 | Large stones. |
| | <50 | --- | --- |

[1] Evaluate the thickest layer between 10 and 60 inches and also the bottom layer. Choose the best rating. When rating is based on bottom layer, verify thickness.

[2] 100 minus percent passing No. 4 sieve is greater than 25.

[3] 100 minus percent passing No. 4 sieve is less than 25.

[4] Thickest layer between 10 and 60 inches.

## Grassed Waterways

| Property | Limits | Restrictive feature [1] |
|---|---|---|
| 1. USDA texture | Ice | Permafrost. |
| 2. Moisture regime | Aridic, Torric | Too arid. |
| 3. Fraction greater than 3 inches (percent by weight) [2] | >15 | Large stones. |
| 4. Depth to high water table (ft) | <1.5 | Wetness. |
| 5. Slope (percent) | >8 | Slope. |
| 6. Salinity (surface layer) (mmhos/cm) | >4 | Excess salt. |
| 7. Sodium adsorption ratio in the upper 40 inches (great group) | >12 (natric, halic, alkali phases) | Excess sodium. |
| 8. Erosion factor K (upper 40 inches) | >.35 | Erodes easily. |
| 9. Available water capacity (in/in) [2] | <0.10 | Droughty. |
| 10. Depth to bedrock (inches) | <40 | Depth to rock. |
| 11. Depth to cemented pan (inches) | <40 | Cemented pan. |
| 12. Fragipan (great group) | All Fragi | Rooting depth. |
| 13. Bulk density in the upper 40 inches (g/cc) | >1.7 | Rooting depth. |
| 14. Permeability in the upper 40 inches (in/hr) | <0.2 | Percs slowly. |

[1] If the soil has no restrictive features, the rating is *favorable.*
[2] Weighted average to 40 inches.

## Irrigation

| Property | Limits | Restrictive feature [1] |
|---|---|---|
| 1. USDA texture | Ice | Permafrost. |
| 2. Slope (percent) | >3 | Slope. |
| 3. Fraction greater than 3 inches (percent by weight) [2] | >25 | Large stones. |
| 4. Depth to high water table (feet) | +<br><3 [3] | Ponding.<br>Wetness. |
| 5. Available water capacity (inches/inch) [2] | <0.10 | Droughty. |
| 6. USDA texture (surface layer) | COS, S, FS, VFS, LCOS, LS, LFS, LVFS | Fast intake. |
| 7. USDA texture (surface layer) | SIC, C, SC | Slow intake. |
| 8. Wind erodibility group | 1, 2, 3 | Soil blowing. |
| 9. Permeability in the upper 60 inches (inches/hour) | <0.2 | Percs slowly. |
| 10. Depth to bedrock (inches) | <40 | Depth to rock. |
| 11. Depth to cemented pan (inches) | <40 | Cemented pan. |
| 12. Fragipan (great group) | All Fragi | Rooting depth. |
| 13. Bulk density in the upper 40 inches (g/cc) | >1.7 | Rooting depth. |
| 14. Erosion factor K (surface layer) | >.35 | Erodes easily. |
| 15. Flooding | Common | Flooding. |
| 16. Sodium adsorption ratio in the upper 40 inches (great group or phase) | >12<br>(natric, halic, alkali phases) | Excess sodium. |
| 17. Salinity in the upper 40 inches (mmhos/cm) | >4 | Excess salt. |
| 18. Soil reaction (pH) (any depth) | <3.6 | Too acid. |
| 19. Complex landscape | (4) | Complex slope. |
| 20. Formation of pits | (5) | Pitting. |
| 21. Carbonates | (6) | Excess lime. |

[1] If the soil has no restrictive features, the rating is *favorable*.

[2] Weighted average to 40 inches.

[3] Disregard if depth to water table is below 3 feet during growing season.

[4] If complex and irregular slopes cause difficulty in design, installation, or functioning of the system, list "Complex slope" as a restrictive feature.

[5] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, list "Pitting" as a restrictive feature.

[6] If the amount of carbonate is so high that it restricts the growth of plants, list "Excess lime" as a restrictive feature.

## Lawns, Landscaping, and Golf Fairways

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Salinity of surface layer (mmhos/cm) | <4 | 4-8 | >8 | Excess salt. |
| 3. Sodium adsorption ratio in the upper 40 inches (great group) | --- | --- | >12 (halic, natric, alkali phases) | Excess sodium. |
| 4. Soil reaction (pH of surface layer) | --- | --- | <3.6 | Too acid. |
| 5. Sulfidic materials (great group) | --- | --- | Sulfaquents, Sulfihemists. | Excess sulfur. |
| 6. Coarse fragments in surface layer (percent by weight) [1] | <25 | 25-50 | >50 | Small stones. |
| 7. Fraction greater than 3 inches in surface layer (percent by weight) | <5 | 5-30 | >30 | Large stones. |
| 8. Depth to high water table (feet) | ---<br>>2 | ---<br>1-2 | +<br><1 | Ponding.<br>Wetness. |
| 9. Available water capacity (in/in) [2] | >.10 | 05- 10 | <.05 | Droughty. |
| 10. Flooding | None, rare | Occasional | Frequent | Flooding. |
| 11. Slope (percent) | <8 | 8-15 | >15 | Slope. |
| 12. Depth to bedrock (inches) | >40 | 20-40 | <20 | Depth to rock. |
| 13. Depth to cemented pan (inches) | >40 | 20-40 | <20 | Cemented pan. |
| 14. USDA texture (surface layer) [3] | --- | --- | SIC, C, SC | Too clayey. |
| 15. USDA texture (surface layer) | --- | --- | FB, HM, MUCK, SP, MPT, PEAT | Excess humus. |
| 16. USDA texture (surface layer) | --- | LCOS, S | COS | Too sandy. |
| 17. Carbonates | --- | --- | ([4]) | Excess lime. |

[1] 100 minus percent passing No. 10 sieve.
[2] Weighted average to 40 inches.
[3] If soil is in kaolinitic family, rate one class better if experience confirms.
[4] If the amount of carbonate is so high that it restricts the growth of plants, rate "Severe—excess lime."

## Local Roads and Streets

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Total subsidence | --- | --- | >12 | Subsides. |
| 3. Depth to bedrock (inches): | | | | |
| Hard | >40 | 20-40 | <20 | Depth to rock. |
| Soft | >20 | <20 | --- | Depth to rock. |
| 4. Depth to cemented pan (inches): | | | | |
| Thick | >40 | 20-40 | <20 | Cemented pan. |
| Thin | >20 | <20 | --- | Cemented pan. |
| 5. Shrink-swell potential [1] | Low | Moderate | High, very high | Shrink-swell. |
| 6. AASHTO group index number [1 2 3] | <5 | 5-8 | >8 | Low strength. |
| 7. Depth to high water table (feet) | --- | --- | + | Ponding. |
| | >2.5 | 1.0-2.5 | <1.0 | Wetness. |
| 8. Slope (percent) | <8 | 8-15 | >15 | Slope. |
| 9. Flooding | None | Rare | Common | Flooding. |
| 10. Potential frost action | Low | Moderate | High | Frost action. |
| 11. Fraction greater than 3 inches (percent by weight) [4] | <25 | 25-50 | >50 | Large stones. |
| 12. Downslope movement | --- | --- | (5) | Slippage. |
| 13. Formation of pits | --- | --- | (6) | Pitting. |
| 14. Differential settling | --- | --- | (7) | Unstable fill. |

[1] Thickest layer between 10 and 40 inches.

[2] GIN = (F-35)[.2 + .005(LL-40)] + .01 (F-15)(PI-10) where F = percent passing No. 200 sieve. If F is <35 and PI is >11, use only part 2 of equation. Use median values.

[3] If in kaolinitic family, rate one class better if experience confirms.

[4] Weighted average to 40 inches.

[5] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate "Severe—slippage."

[6] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate "Severe—pitting."

[7] If the soil is susceptible to differential settling, rate "Severe—unstable fill."

## Paths and Trails

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Fraction greater than 3 inches in surface layer (percent by weight) | <25 | 25-50 | >50 | Large stones. |
| 3. Depth to high water table (feet) | >2<br>--- | 1-2<br>--- | <1<br>+ | Wetness.<br>Ponding. |
| 4. USDA texture (surface layer) [1] | --- | --- | SC, SIC, C | Too clayey. |
| 5. USDA texture (surface layer) | --- | LCOS, VFS, LFS [2], LS [2] | COS, S, FS | Too sandy. |
| 6. Unified (surface layer) | --- | --- | PT | Excess humus. |
| 7. Slope (percent) | <15 | 15-25 | >25 | Slope. |
| 8. Erosion factor K (surface layer) | --- | --- | >.35 [3] | Erodes easily. |
| 9. Coarse fragments in surface layer (percent by weight) [4] | --- | --- | >65 | Small stones. |
| 10. Flooding | None, rare, occasional. | Frequent | --- | Flooding. |
| 11. USDA texture (surface layer) [5] | --- | SIL, SI, VFSL, L | --- | Dusty. |
| 12. Other | --- | --- | ([6]) | Fragile. |

[1] Rate soils in UST, TOR, ARID, BOR, or XER suborders, great groups, or subgroups one class better.
[2] Rate "slight" if finer textured material is within 20 inches of the surface.
[3] Disregard on slopes of 8 percent or less.
[4] 100 minus percent passing No. 10 sieve.
[5] Disregard unless soil is in TOR, ARID, or XER suborders, great groups, or subgroups.
[6] If the soil is easily damaged by use or disturbance, rate "Severe—fragile."

## Picnic Areas

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Slope (percent) | <8 | 8-15 | >15 | Slope. |
| 3. Flooding | None, rare, occasional. | Frequent | --- | Flooding. |
| 4. Depth to high water table (feet) | >2.5<br>--- | 1.0-2.5<br>--- | <1.0<br>+ | Wetness.<br>Ponding. |
| 5. USDA texture modifier (surface layer) | --- | STV, BYV, CB, FL | STX, BYX, CBX, FLX, CBV, FLV, CNX, CRX, SHX, SYX | Large stones. |
| 6. USDA texture (surface layer) [1] | --- | --- | SC, SIC, C | Too clayey. |
| 7. USDA texture (surface layer) | --- | LCOS, VFS, LFS [2], LS [2] | COS, S, FS | Too sandy. |
| 8. Unified (surface layer) | --- | --- | PT | Excess humus. |
| 9. Coarse fragments in surface layer (percent) [3] | <25 | 25-50 | >50 | Small stones. |
| 10. Sodium adsorption ratio in the upper 40 inches (great group) | --- | --- | >12 (natric, halic, alkali phases) | Excess sodium. |
| 11. Salinity (surface layer) (mmhos/cm) | <4 | 4-8 | >8 | Excess salt. |
| 12. Soil reaction (pH of surface layer) | --- | --- | <3.6 | Too acid. |
| 13. Permeability in the upper 40 inches (in/hr) [1] | >0.6 | 0.06-0.6 | <0.06 | Percs slowly. |
| 14. USDA texture (surface layer) [4] | --- | SIL, SI, VFSL, L | --- | Dusty. |
| 15. Depth to bedrock (inches) | --- | --- | <20 | Depth to rock. |
| 16. Depth to cemented pan (inches) | --- | --- | <20 | Cemented pan. |
| 17. Other | --- | --- | (5) | Fragile. |

[1] Rate soils in UST, TOR, BOR, XER, or ARID suborders, great groups, or subgroups one class better.
[2] Rate "slight" if finer textured material is within 20 inches of the surface.
[3] 100 minus percent passing No. 10 sieve.
[4] Disregard unless soil is in TOR, ARID, or XER suborders, great groups, or subgroups.
[5] If the soil is easily damaged by use or disturbance, rate "Severe—fragile."

## Playgrounds

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. USDA texture modifier (surface layer) | --- | ST | STV, STX, BYV, BYX, CB, CBV, FL, FLV, BY, CBX, CNX, CRX, FLX, SHX, SYX | Large stones. |
| 3. Slope (percent) | <2 | 2-6 | >6 | Slope. |
| 4. Coarse fragments in surface layer (percent) [1] | <10 | 10-25 | >25 | Small stones. |
| 5. USDA texture (surface layer) [2] | --- | --- | SC, SIC, C | Too clayey. |
| 6. USDA texture (surface layer) | --- | LCOS, VFS, LFS [3], LS [3] | COS, S, FS | Too sandy. |
| 7. Unified (surface layer) | --- | --- | PT | Excess humus. |
| 8. Depth to high water table (feet) | <2.5<br>--- | 1.5-2.5<br>--- | <1.5<br>+ | Wetness.<br>Ponding. |
| 9. Flooding | None, rare | Occasional | Frequent | Flooding. |
| 10. Depth to bedrock (inches) | >40 | [4] 20-40 | <20 | Depth to rock. |
| 11. Depth to cemented pan (inches) | >40 | [4] 20-40 | <20 | Cemented pan. |
| 12. Permeability in the upper 40 inches (in/hr) [2] | >0.6 | 0.06-0.6 | <0.06 | Percs slowly. |
| 13. USDA texture (surface layer) [5] | --- | SIL, SI, VFSL, L | --- | Dusty. |
| 14. Sodium adsorption ratio in the upper 40 inches (great group) | --- | --- | >12 (natric, halic, alkali phases) | Excess sodium. |
| 15. Salinity (surface layer) (mmhos/cm) | <4 | 4-8 | >8 | Excess salt. |
| 16. Soil reaction (pH of surface layer) | --- | --- | <3.6 | Too acid. |
| 17. Other | --- | --- | ([6]) | Fragile. |

[1] 100 minus percent passing No. 10 sieve.
[2] Rate soils in UST, TOR, ARID, BOR, or XER suborders, great groups, or subgroups one class better.
[3] Rate "slight" if finer textured material is within 20 inches of the surface.
[4] Rate *slight* if slopes are 0 to 2 percent.
[5] Disregard unless soil is in TOR, ARID, or XER suborders, great groups, or subgroups.
[6] If the soil is easily damaged by use or disturbance, rate "Severe—fragile."

## Pond Reservoir Areas

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Permeability between 20 and 60 inches (inches/hour) | <0.6 | 0.6-2.0 | >2.0 | Seepage. |
| 3. Depth to bedrock (inches) | >60 | 20-60 | <20 | Depth to rock. |
| 4. Depth to cemented pan (inches) | >60 | 20-60 | <20 | Cemented pan. |
| 5. Slope (percent) | <3 | 3-8 | >8 | Slope. |
| 6. USDA texture (all depths) | --- | --- | MARL, GYP | Seepage. |
| 7. Downslope movement | --- | --- | (1) | Slippage. |
| 8. Formation of pits | --- | --- | (2) | Pitting. |

[1] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate "Severe—slippage."

[2] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate "Severe—pitting."

## Roadfill

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Good | Fair | Poor | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Depth to bedrock (inches) | >60 | 40-60 | <40 | Depth to rock. |
| 3. AASHTO group index number [1] [2] [3] | <5 | 5-8 | >8 | Low strength. |
| 4. Depth to cemented pan (inches) | >60 | 40-60 | <40 | Cemented pan. |
| 5. Layer thickness (inches) | >60 | 30-60 | <30 | Thin layer. |
| 6. Fraction greater than 3 inches (percent by weight) [4] | <25 | 25-50 | >50 | Large stones. |
| 7. Depth to high water table (feet) | >3 | 1-3 | <1 | Wetness. |
| 8. Slope (percent) | <15 | 15-25 | >25 | Slope. |
| 9. Shrink-swell potential [2] | Low | Moderate | High, very high | Shrink-swell. |

[1] GIN = (F-35)[.2 + .005(LL-40)] + .01 (F-15)(PI-10) where F = percent passing No. 200 sieve. If F is <35 and PI is >11, use only part 2 of equation. Use median values.

[2] Evaluate the thickest layer between 10 and 60 inches and also the bottom layer. Choose the best rating. When rating is based on bottom layer, verify thickness.

[3] If in kaolinitic family, rate one class better if experience confirms.

[4] Weighted average to 40 inches.

## Sand

| Property | Limits | | Restrictive feature |
|---|---|---|---|
| | Probable source | Improbable source | |
| 1. USDA texture | --- | Ice | Permafrost. |
| 2. Unified [1] | SW, SP, SW-SM, SP-SM | --- | --- |
| | GW[2], GP[2], GW-GM[2], GP-GM[2] | --- | --- |
| | --- | GW[3], GP[3], GW-GM[3], GP-GM[3] | Small stones. |
| | --- | PT | Excess humus. |
| | --- | All other | Excess fines. |
| 3. Layer thickness (inches) | --- | <36 | Thin layer. |
| | >36 | --- | --- |
| 4. Fraction greater than 3 inches (percent by weight) [4] | --- | >50 | Large stones. |
| | <50 | --- | --- |

[1] Evaluate the thickest layer between 10 and 60 inches and also the bottom layer. Choose the best rating. When rating is based on bottom layer, verify thickness.

[2] Percent passing No. 4 sieve minus percent passing No. 200 sieve is greater than 25.

[3] Percent passing No. 4 sieve minus percent passing No. 200 sieve is less than 25.

[4] Thickest layer between 10 and 60 inches.

## Sanitary Landfill (Trench)

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Flooding | None | Rare | Common | Flooding. |
| 3. Depth to bedrock (inches) | --- | --- | <72 | Depth to rock. |
| 4. Depth to cemented pan (inches): | | | | |
| Thick | --- | --- | <72 | Cemented pan. |
| Thin | --- | <72 | --- | Cemented pan. |
| 5. Permeability of bottom layer (in/hr) [1] | --- | --- | >2.0 | Seepage. |
| 6. Depth to high water table (feet) | --- | --- | + | Ponding. |
| Apparent | --- | --- | <6 | Wetness. |
| Perched | >4 | 2-4 | <2 | Wetness. |
| 7. Slope (percent) | <8 | 8-15 | >15 | Slope. |
| 8. USDA texture [1 2 3] | --- | CL, SC, SICL | SIC, C | Too clayey. |
| 9. USDA texture [3] | --- | LCOS, LS, LFS, LVFS | COS, S, FS, VFS, SG | Too sandy. |
| 10. Unified [3] | --- | --- | OL, OH, PT | Excess humus. |
| 11. Fraction greater than 3 inches (percent by weight) [4] | <20 | 20-35 | >35 | Large stones. |
| 12. Sodium adsorption ratio (great group) [1] | --- | --- | >12 (natric, halic, alkali phases) | Excess sodium. |
| 13. Soil reaction (any depth) (pH) | --- | --- | <3.6 | Too acid. |
| 14. Salinity (any depth) (mmhos/cm) | --- | --- | >16 | Excess salt. |
| 15. Downslope movement | --- | --- | ([5]) | Slippage. |
| 16. Differential settling | --- | --- | ([6]) | Unstable fill. |

[1] Disregard in all Aridisols except Salorthids and Aquic intergrades, all Aridic subgroups, and all Torri great groups of Entisols except Aquic.

[2] If soil is in kaolinitic family, rate one class better if experience confirms.

[3] Thickest layer between 10 and 60 inches.

[4] Weighted average to 60 inches.

[5] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate "Severe—slippage."

[6] If the soil is susceptible to differential settling rate "Severe—unstable fill."

## Septic Tank Absorption Fields

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Flooding | None | Rare | Common | Flooding. |
| 3. Depth to bedrock (inches) | >72 | 40-72 | <40 | Depth to rock. |
| 4. Depth to cemented pan (inches) | >72 | 40-72 | <40 | Cemented pan. |
| 5. Depth to high water table (feet) | ---<br>>6 | ---<br>4-6 | +<br><4 | Ponding.<br>Wetness. |
| 6. Permeability (in/hr):<br>24 to 60 inches<br>24 to 40 inches | 2.0-6.0<br>--- | [1] 0.6-2.0<br>--- | <0.6<br>>6.0 | Percs slowly.<br>Poor filter. |
| 7. Slope (percent) | <8 | 8-15 | >15 | Slope. |
| 8. Fraction greater than 3 inches (percent by weight) [2] | <25 | 25-50 | >50 | Large stones. |
| 9. Total subsidence (inches) | --- | --- | >24 | Subsides. |
| 10. Downslope movement | --- | --- | ([3]) | Slippage. |
| 11. Formation of pits | --- | --- | ([4]) | Pitting. |

[1] Recheck to see if rating should be *slight.*

[2] Weighted average to 40 inches.

[3] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate "Severe—slippage."

[4] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate "Severe—pitting."

## Sewage Lagoons

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Permeability between 12 and 60 inches (in/hr) | <0.6 | 0.6-2.0 | >2.0 | Seepage. |
| 3. Depth to bedrock (inches) | >60 | 40-60 | <40 | Depth to rock. |
| 4. Depth to cemented pan (inches) | >60 | 40-60 | <40 | Cemented pan. |
| 5. Flooding | None, rare | --- | Common [1] | Flooding. |
| 6. Slope (percent) | <2 | 2-7 | >7 | Slope. |
| 7. Unified (any depth) | --- | OL, OH | PT | Excess humus. |
| 8. Depth to high water table (feet) | ---<br>>5 | ---<br>3.5-5 [2] | +<br><3.5 [2] | Ponding.<br>Wetness. |
| 9. Fraction greater than 3 inches (percent by weight) [3] | <20 | 20-35 | >35 | Large stones. |
| 10. Downslope movement | --- | --- | (4) | Slippage. |
| 11. Formation of pits | --- | --- | (5) | Pitting. |
| 12. Differential settling | --- | --- | (6) | Unstable fill. |

[1] If floodwater will not enter or damage the sewage lagoon because of low velocity and a water depth of less than 5 feet, disregard flooding.

[2] Disregard wetness if a layer at least 20 inches thick has permeability of less than 0.2 in/hr.

[3] Weighted average to 20 inches.

[4] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate "Severe—slippage."

[5] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate "Severe—pitting."

[6] If the soil is susceptible to differential settling, rate "Severe—unstable fill."

## Shallow Excavations

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Depth to bedrock (inches): | | | | |
| Hard | >60 | 40-60 | <40 | Depth to rock. |
| Soft | >40 | 20-40 | <20 | Depth to rock. |
| 3. Depth to cemented pan (inches): | | | | |
| Thick | >60 | 40-60 | <40 | Cemented pan. |
| Thin | >40 | 20-40 | <20 | Cemented pan. |
| 4. USDA texture (20 to 60 inches) | --- | SI [1] | COS, S, FS, VFS, LCOS, LS, LFS, LVFS, G, SG | Cutbanks cave. |
| 5. USDA texture (20 to 60 inches) | --- | C, SIC | --- | Too clayey. |
| 6. Soil order | --- | --- | Vertisols | Cutbanks cave. |
| 7. Bulk density (20 to 60 inches) (g/cc) | --- | >1.8 | --- | Dense layer. |
| 8. Unified (20 to 60 inches) | --- | --- | OL, OH, PT | Excess humus. |
| 9. Fraction greater than 3 inches (percent by weight) [2] | <25 | 25-50 | >50 | Large stones. |
| 10. Depth to high water table (feet) | --- | --- | + | Ponding. |
| | >6 | 2.5-6 | <2.5 | Wetness. |
| 11. Flooding | None, rare | Common | --- | Flooding. |
| 12. Slope (percent) | <8 | 8-15 | >15 | Slope. |
| 13. Downslope movement | --- | --- | ([3]) | Slippage. |

[1] In areas of loess, rating should be *slight.*
[2] Weighted average to 40 inches.
[3] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate "Severe—slippage."

## Small Commercial Buildings

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Slight | Moderate | Severe | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Flooding | None | --- | Rare, common. | Flooding. |
| 3. Depth to high water table (feet) | ---<br>>2.5 | ---<br>1.5-2.5 | +<br><1.5 | Ponding.<br>Wetness. |
| 4. Shrink-swell potential [1] | Low | Moderate | High, very high | Shrink-swell. |
| 5. Slope (percent) | <4 | 4-8 | >8 | Slope. |
| 6. Unified [1] | --- | --- | OL, OH, PT | Low strength. |
| 7. Depth to bedrock (inches): | | | | |
| Hard | >40 | 20-40 | <20 | Depth to rock. |
| Soft | >20 | <20 | --- | Depth to rock. |
| 8. Depth to cemented pan (inches): | | | | |
| Thick | >40 | 20-40 | <20 | Cemented pan. |
| Thin | >20 | <20 | --- | Cemented pan. |
| 9. Fraction greater than 3 inches (percent by weight) [2] | <25 | 25-50 | >50 | Large stones. |
| 10. Total subsidence | --- | --- | >12 | Subsides. |
| 11. Downslope movement | --- | --- | ([3]) | Slippage. |
| 12. Formation of pits | --- | --- | ([4]) | Pitting. |
| 13. Differential settling | --- | --- | ([5]) | Unstable fill. |

[1] Thickest layer between 10 and 40 inches.
[2] Weighted average to 40 inches.
[3] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate "Severe—slippage."
[4] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate "Severe—pitting."
[5] If the soil is susceptible to differential settling, rate "Severe—unstable fill."

## Topsoil

| Property | Limits | | | Restrictive feature |
|---|---|---|---|---|
| | Good | Fair | Poor | |
| 1. USDA texture | --- | --- | Ice | Permafrost. |
| 2. Depth to bedrock (inches) | >40 | 20-40 | <20 | Depth to rock. |
| 3. Depth to cemented pan (inches) | >40 | 20-40 | <20 | Cemented pan. |
| 4. Depth to bulk density greater than 1.8 g/cc (inches) | >40 | 20-40 | <20 | Area reclaim. |
| 5. USDA texture [1] | --- | LCOS, LS, LFS, LVFS | COS, S, FS, VFS | Too sandy. |
| 6. USDA texture [1] | --- | SCL [2], CL [2], SICL [2] | SIC, C, SC | Too clayey. |
| 7. USDA texture [1] | --- | --- | FB, HM, SP, MPT, MUCK, PEAT, CE | Excess humus. |
| 8. Fraction greater than 3 inches (percent by weight): [3] | | | | |
| 0 to 40 inches | <5 | 5-25 | >25 | Large stones. |
| 40 to 60 inches | <15 | 15-30 | >30 | Area reclaim. |
| 9. Coarse fragments (percent): [3] | | | | |
| 0 to 40 inches | <5 | 5-25 | >25 | Small stones. |
| 40 to 60 inches | <25 | 25-50 | >50 | Area reclaim. |
| 10. Salinity (mmhos/cm) [1] | <4 | 4-8 | >8 | Excess salt. |
| 11. Layer thickness (inches) | >40 | 20-40 | <20 | Thin layer. |
| 12. Depth to high water table (feet) | --- | --- | <1 | Wetness. |
| 13. Sodium adsorption ratio in the upper 40 inches (great group or phase) | --- | --- | >12 (halic, natric, alkali phases) | Excess sodium. |
| 14. Soil reaction (pH) [1] | --- | --- | <3.6 | Too acid. |
| 15. Slope (percent) | <8 | 8-15 | >15 | Slope. |
| 16. Carbonates | --- | --- | (4) | Excess lime. |

[1] Thickest layer between 0 and 40 inches.

[2] If soil contains more than 3 percent organic matter and has less than 35 percent clay, rate *good.*

[3] Sum (100 minus percent passing No. 10 sieve) and fraction greater than 3 inches. Use dominant condition for restrictive feature.

[4] If the amount of carbonate is so high that it restricts the growth of plants, rate "Poor—excess lime."

# Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1948-88 at Weaverville, California)

| Month | Temperature | | | | | | Precipitation | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2 years in 10 will have-- | | | | 2 years in 10 will have-- | | |
| | Average daily maximum | Average daily minimum | Average | Maximum temperature higher than-- | Minimum temperature lower than-- | Average number of growing degree days* | Average | Less than-- | More than-- | Average number of days with 0.10 inch or more |
| | °F | °F | °F | °F | °F | Units | In | In | In | |
| January----- | 46.7 | 26.1 | 36.4 | 65 | 5 | 25 | 7.80 | 3.48 | 11.48 | 10 |
| February---- | 53.7 | 28.5 | 41.1 | 73 | 11 | 84 | 5.70 | 2.44 | 8.48 | 9 |
| March------- | 57.8 | 29.9 | 43.9 | 79 | 16 | 156 | 4.21 | 1.88 | 6.20 | 9 |
| April------- | 66.5 | 33.3 | 49.9 | 89 | 21 | 304 | 2.04 | .64 | 3.19 | 5 |
| May--------- | 76.3 | 39.3 | 57.8 | 99 | 25 | 539 | 1.04 | .32 | 1.79 | 2 |
| June-------- | 84.5 | 44.8 | 64.7 | 104 | 31 | 752 | .54 | .15 | 1.11 | 1 |
| July-------- | 93.4 | 48.6 | 71.0 | 107 | 36 | 951 | .20 | .04 | .48 | 0 |
| August------ | 92.1 | 47.6 | 69.9 | 107 | 37 | 922 | .42 | .10 | 1.08 | 1 |
| September--- | 86.3 | 42.0 | 64.2 | 104 | 28 | 719 | .97 | .22 | 1.76 | 2 |
| October----- | 73.8 | 35.2 | 54.5 | 96 | 20 | 442 | 2.52 | .60 | 4.16 | 4 |
| November---- | 56.3 | 31.7 | 44.0 | 79 | 13 | 139 | 5.53 | 2.01 | 8.46 | 8 |
| December---- | 46.4 | 28.5 | 37.4 | 63 | 8 | 31 | 7.16 | 2.71 | 10.88 | 9 |
| Yearly: | | | | | | | | | | |
| Average--- | 69.5 | 36.3 | 52.9 | --- | --- | --- | --- | --- | --- | --- |
| Extreme--- | 115 | -10 | --- | 109 | 4 | --- | --- | --- | --- | --- |
| Total----- | --- | --- | --- | --- | --- | 5,063 | 38.15 | 13.73 | 47.40 | 60 |

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1948-88 at Weaverville, California)

| Probability | Temperature | | |
|---|---|---|---|
| | 24 °F or lower | 28 °F or lower | 32 °F or lower |
| Last freezing temperature in spring: | | | |
| 1 year in 10 later than-- | May 5 | May 28 | June 18 |
| 2 years in 10 later than-- | Apr. 26 | May 21 | June 9 |
| 5 years in 10 later than-- | Apr. 8 | May 7 | May 24 |
| First freezing temperature in fall: | | | |
| 1 year in 10 earlier than-- | Oct. 2 | Sept. 21 | Sept. 13 |
| 2 years in 10 earlier than-- | Oct. 10 | Sept. 27 | Sept. 18 |
| 5 years in 10 earlier than-- | Oct. 24 | Oct. 8 | Sept. 26 |

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

| Map symbol | Soil name | Acres | Percent |
|---|---|---|---|
| *101 | Atter extremely gravelly loamy sand, 9 to 15 percent slopes | 374 | 0.2 |
| *102 | Atter-Dumps, dredge tailings-Xerofluvents complex, 2 to 9 percent slopes | 2,575 | 1.3 |
| 103 | Bamtush-Brownbear complex, 15 to 30 percent slopes | 599 | 0.3 |
| 104 | Bamtush-Brownbear complex, 50 to 75 percent slopes | 4,061 | 2.1 |
| 105 | Bamtush-Brownbear-Weaverville complex, 30 to 75 percent slopes | 2,997 | 1.5 |
| 106 | Bamtush-Weaverville complex, 15 to 30 percent slopes | 220 | 0.1 |
| 107 | Bamtush-Weaverville-Brownbear complex, 15 to 50 percent slopes | 2,684 | 1.4 |
| 109 | Barpeak-Sheetiron complex, 50 to 90 percent slopes | 6,597 | 3.4 |
| 110 | Beargulch-Skyrock complex, 50 to 75 percent slopes | 3,553 | 1.8 |
| 111 | Brockgulch-Dedrick-Brownbear complex, 50 to 75 percent slopes | 8,541 | 4.4 |
| 112 | Brownbear-Bamtush complex, 30 to 50 percent slopes | 3,073 | 1.6 |
| 113 | Brownscreek gravelly loam, 30 to 50 percent slopes | 283 | 0.1 |
| 114 | Brownscreek gravelly loam, 50 to 75 percent slopes | 1,663 | 0.8 |
| 115 | Brownscreek-Dedrick complex, 50 to 75 percent slopes | 724 | 0.4 |
| 116 | Brownscreek-Dougcity complex, 30 to 50 percent slopes | 3,721 | 1.9 |
| 117 | Brownscreek-Dougcity complex, 50 to 75 percent slopes | 15,100 | 7.7 |
| 118 | Cargent-Demogul association, 50 to 75 percent slopes | 903 | 0.5 |
| 119 | Cargent-Demogul association, 75 to 90 percent slopes | 385 | 0.2 |
| 120 | Caris extremely gravelly sandy loam, 50 to 75 percent slopes | 2,750 | 1.4 |
| 121 | Caris extremely gravelly sandy loam, 75 to 90 percent slopes | 1,061 | 0.5 |
| 122 | Caris-Indleton-Hoosimbim complex, 50 to 75 percent slopes | 2,453 | 1.3 |
| 123 | Carrcreek gravelly loam, 0 to 2 percent slopes | 1,606 | 0.8 |
| 124 | Carrcreek gravelly loam, 2 to 5 percent slopes | 234 | 0.1 |
| 125 | Choop fine gravelly loamy coarse sand, 50 to 75 percent slopes | 497 | 0.3 |
| 126 | Choop-Rock outcrop complex, 50 to 90 percent slopes | 229 | 0.1 |
| *127 | Crefork loam, 2 to 9 percent slopes | 890 | 0.5 |
| *128 | Crefork loam, 9 to 15 percent slopes | 651 | 0.3 |
| *129 | Crefork clay loam, 15 to 30 percent slopes | 3,444 | 1.8 |
| *131 | Crefork-Musserhill complex, 30 to 50 percent slopes | 1,858 | 0.9 |
| 132 | Dedrick gravelly loam, 50 to 75 percent slopes | 317 | 0.2 |
| 133 | Dedrick-Rock outcrop complex, 50 to 75 percent slopes | 715 | 0.4 |
| 134 | Demogul gravelly loam, 50 to 75 percent slopes | 296 | 0.2 |
| 136 | Dougcity-Dedrick complex, 50 to 75 percent slopes | 480 | 0.2 |
| 137 | Dougcity-Demogul complex, 50 to 75 percent slopes | 1,382 | 0.7 |
| 138 | Dubakella cobbly clay loam, 15 to 30 percent slopes | 213 | 0.1 |
| 139 | Dubakella cobbly clay loam, 30 to 50 percent slopes | 1,093 | 0.6 |
| 140 | Dubakella cobbly clay loam, 50 to 75 percent slopes | 515 | 0.3 |
| 141 | Dubakella stony loam, 30 to 50 percent slopes | 490 | 0.3 |
| 142 | Etsel very gravelly loam, 30 to 50 percent slopes | 118 | 0.1 |
| 143 | Etsel-Bamtush complex, 50 to 75 percent slopes | 1,205 | 0.6 |
| 144 | Etsel-Weitchpec complex, 50 to 75 percent slopes | 398 | 0.2 |
| 145 | Goulding-Holkat Variant-Marpa Variant complex, 50 to 75 percent slopes | 767 | 0.4 |
| 146 | Goulding-Vitzthum-Vanvor complex, 50 to 75 percent slopes | 5,728 | 2.9 |
| *147 | Haploxerolls, warm, 0 to 2 percent slopes | 266 | 0.1 |
| 148 | Haploxerolls, 2 to 9 percent slopes | 338 | 0.2 |
| *149 | Haysum loam, 5 to 9 percent slopes | 185 | 0.1 |
| *150 | Haysum gravelly loam, 0 to 2 percent slopes | 1,208 | 0.6 |
| *151 | Haysum gravelly loam, 2 to 5 percent slopes | 164 | 0.1 |
| *152 | Haysum gravelly loam, 5 to 9 percent slopes | 529 | 0.3 |
| 153 | Holkat-Hoosimbim complex, 30 to 50 percent slopes | 581 | 0.3 |
| 154 | Holkat-Hoosimbim complex, 50 to 75 percent slopes | 3,315 | 1.7 |
| 155 | Holkat Variant-Dedrick association, 50 to 75 percent slopes | 521 | 0.3 |
| 156 | Hoosimbim gravelly loam, 30 to 50 percent slopes | 847 | 0.4 |
| 157 | Hoosimbim-Bamtush-Marpa complex, 30 to 50 percent slopes | 3,832 | 2.0 |
| 158 | Hoosimbim-Etsel complex, 30 to 50 percent slopes | 1,310 | 0.7 |
| 159 | Hoosimbim-Goulding complex, 50 to 75 percent slopes | 1,131 | 0.6 |
| 160 | Hotaw loam, 15 to 30 percent slopes | 231 | 0.1 |
| 161 | Hotaw loam, 30 to 50 percent slopes | 1,019 | 0.5 |
| 162 | Indleton-Caris-Hoosimbim complex, 50 to 75 percent slopes | 7,404 | 3.8 |
| *163 | Jafa loam, 0 to 5 percent slopes | 605 | 0.3 |
| *164 | Jafa loam, 5 to 15 percent slopes | 961 | 0.5 |
| *165 | Jafa gravelly loam, 0 to 2 percent slopes | 209 | 0.1 |

See footnotes at end of table.

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

| Map symbol | Soil name | Acres | Percent |
|---|---|---|---|
| *166 | Jafa gravelly loam, 2 to 9 percent slopes | 1,794 | 0.9 |
| *167 | Jafa gravelly loam, clayey substratum, 15 to 30 percent slopes | 463 | 0.2 |
| 170 | Marpa-Hoosimbim complex, 30 to 50 percent slopes | 384 | 0.2 |
| 171 | Marpa-Hoosimbim-Bamtush complex, 50 to 75 percent slopes | 12,591 | 6.4 |
| 172 | Marpa-Vitzthum complex, 50 to 75 percent slopes | 1,873 | 1.0 |
| 173 | Marpa Variant-Goulding-Holkat Variant complex, 30 to 50 percent slopes | 745 | 0.4 |
| 175 | Millsholm loam, 5 to 9 percent slopes | 353 | 0.2 |
| 176 | Millsholm-Azule complex, 15 to 30 percent slopes | 1,588 | 0.8 |
| 177 | Minersville sandy loam, 50 to 75 percent slopes | 2,514 | 1.3 |
| 178 | Minersville Variant-Choop complex, 50 to 75 percent slopes | 1,186 | 0.6 |
| *179 | Musserhill gravelly loam, 15 to 30 percent slopes | 946 | 0.5 |
| *180 | Musserhill gravelly loam, 30 to 50 percent slopes | 1,429 | 0.7 |
| *181 | Musserhill-Weaverville complex, 15 to 30 percent slopes | 540 | 0.3 |
| *182 | Musserhill-Weaverville complex, 30 to 50 percent slopes | 3,089 | 1.6 |
| *183 | Musserhill-Weaverville-Urban land complex, 9 to 30 percent slopes | 399 | 0.2 |
| 184 | Musserhill Variant loam, 30 to 50 percent slopes | 1,085 | 0.6 |
| 185 | Pardaloe-Dedrick association, 50 to 75 percent slopes | 2,378 | 1.2 |
| 186 | Pardaloe-Goulding complex, 50 to 75 percent slopes | 4,164 | 2.1 |
| 188 | Rock outcrop | 196 | 0.1 |
| 189 | Rock outcrop-Dedrick complex, 75 to 90 percent slopes | 693 | 0.4 |
| 190 | Sheetiron extremely gravelly loam, 75 to 90 percent slopes | 193 | 0.1 |
| 191 | Sheetiron-Barpeak complex, 50 to 90 percent slopes | 7,944 | 4.1 |
| 192 | Sheetiron Variant-Dedrick complex, 50 to 75 percent slopes | 839 | 0.4 |
| 193 | Skyrock extremely gravelly loam, 50 to 75 percent slopes | 160 | 0.1 |
| 194 | Skyrock-Rock outcrop complex, 50 to 75 percent slopes | 395 | 0.2 |
| 195 | Skyrock Variant-Rock outcrop complex, 30 to 50 percent slopes | 341 | 0.2 |
| 196 | Skyrock Variant-Rock outcrop-Rubble land complex, 50 to 75 percent slopes | 298 | 0.2 |
| 197 | Springgulch-Brockgulch Variant complex, 30 to 50 percent slopes | 2,598 | 1.3 |
| 198 | Tallowbox-Minersville complex, 30 to 50 percent slopes | 1,895 | 1.0 |
| 199 | Tallowbox-Minersville complex, 50 to 75 percent slopes | 9,047 | 4.6 |
| 201 | Urban land-Xeralfs complex, 5 to 30 percent slopes | 881 | 0.4 |
| 202 | Valcreek-Choop complex, 30 to 75 percent slopes | 917 | 0.5 |
| 203 | Valcreek-Minersville complex, 30 to 75 percent slopes | 1,218 | 0.6 |
| 204 | Valcreek-Minersville-Choop complex, 30 to 75 percent slopes | 7,678 | 3.9 |
| 205 | Vanvor-Hoosimbim complex, 30 to 50 percent slopes | 174 | 0.1 |
| 206 | Vanvor-Hoosimbim complex, 50 to 75 percent slopes | 422 | 0.2 |
| 207 | Vitzthum-Cargent complex, 50 to 75 percent slopes | 1,725 | 0.9 |
| *208 | Weaverville loam, 9 to 30 percent slopes | 257 | 0.1 |
| *209 | Weaverville loam, 30 to 50 percent slopes | 317 | 0.2 |
| 210 | Weitchpec-Dubakella complex, 30 to 50 percent slopes | 627 | 0.3 |
| 211 | Weitchpec Variant-Bamtush Variant complex, 9 to 50 percent slopes | 582 | 0.3 |
| 212 | Weitchpec Variant-Bamtush Variant complex, 50 to 75 percent slopes | 1,708 | 0.9 |
| 213 | Xeralfs-Xerorthents complex, 5 to 50 percent slopes | 1,624 | 0.8 |
| *215 | Xererts, 2 to 15 percent slopes | 158 | 0.1 |
| *216 | Xererts-Haysum complex, 2 to 5 percent slopes | 228 | 0.1 |
| 217 | Xerofluvents-Riverwash complex, 0 to 5 percent slopes | 2,747 | 1.4 |
| 218 | Xerorthents-Rock outcrop complex, 2 to 15 percent slopes | 369 | 0.2 |
| 219 | Xerorthents-Rock outcrop complex, 15 to 75 percent slopes | 126 | 0.1 |
| | Water | 23 | ** |
| | Total | 196,000 | 100.0 |

* Boundaries were plotted and verified at closer intervals.
** Less than 0.1 percent.

TABLE 4.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

| Map symbol | Soil name |
|---|---|
| 123 | Carrcreek gravelly loam, 0 to 2 percent slopes (where irrigated) |
| 124 | Carrcreek gravelly loam, 2 to 5 percent slopes (where irrigated) |
| 127 | Crefork loam, 2 to 9 percent slopes (where irrigated) |
| 150 | Haysum gravelly loam, 0 to 2 percent slopes (where irrigated) |
| 151 | Haysum gravelly loam, 2 to 5 percent slopes (where irrigated) |
| 152 | Haysum gravelly loam, 5 to 9 percent slopes (where irrigated) |
| 163 | Jafa loam, 0 to 5 percent slopes (where irrigated) |
| 165 | Jafa gravelly loam, 0 to 2 percent slopes (where irrigated) |
| 216 | Xererts-Haysum complex, 2 to 5 percent slopes (where irrigated) (Haysum portion only) |

TABLE 5.--LAND CAPABILITY

| Soil name and map symbol | Land capability | |
|---|---|---|
| | N | I |
| 101--Atter | VIIs | --- |
| 102: | | |
| Atter | VIIs | --- |
| Dumps | VIII | --- |
| Xerofluvents | VIIs | --- |
| 103: | | |
| Bamtush | IVe | --- |
| Brownbear | VIs | --- |
| 104: | | |
| Bamtush | VIIe | --- |
| Brownbear | VIIe | --- |
| 105: | | |
| Bamtush | VIIe | --- |
| Brownbear | VIIe | --- |
| Weaverville | VIe | --- |
| 106: | | |
| Bamtush | IVe | --- |
| Weaverville | IVe | --- |
| 107: | | |
| Bamtush | VIe | --- |
| Weaverville | IVe | --- |
| Brownbear | VIe | --- |
| 109: | | |
| Barpeak | VIIe | --- |
| Sheetiron | VIIe | --- |
| 110: | | |
| Beargulch | VIIe | --- |
| Skyrock | VIIe | --- |
| 111: | | |
| Brockgulch | VIIe | --- |
| Dedrick | VIIe | --- |
| Brownbear | VIIe | --- |
| 112: | | |
| Brownbear | VIe | --- |
| Bamtush | VIe | --- |
| 113--Brownscreek | VIe | --- |

TABLE 5.--LAND CAPABILITY--Continued

| Soil name and map symbol | Land capability | |
|---|---|---|
| | N | I |
| 114---------- Brownscreek | VIIe | --- |
| 115: | | |
| Brownscreek---------- | VIIe | --- |
| Dedrick---------- | VIIe | --- |
| 116: | | |
| Brownscreek---------- | VIe | --- |
| Dougcity---------- | VIe | --- |
| 117: | | |
| Brownscreek---------- | VIIe | --- |
| Dougcity---------- | VIIe | --- |
| 118, 119: | | |
| Cargent---------- | VIIe | --- |
| Demogul---------- | VIIe | --- |
| 120, 121---------- Caris | VIIe | --- |
| 122: | | |
| Caris---------- | VIIe | --- |
| Indleton---------- | VIIe | --- |
| Hoosimbim---------- | VIIe | --- |
| 123---------- Carrcreek | IIIs | IIIs |
| 124---------- Carrcreek | IIIe | IIIe |
| 125---------- Choop | VIIe | --- |
| 126: | | |
| Choop---------- | VIIe | --- |
| Rock outcrop---------- | VIII | --- |
| 127, 128---------- Crefork | IIIe | --- |
| 129---------- Crefork | IVe | --- |
| 131: | | |
| Crefork---------- | VIe | --- |
| Musserhill---------- | VIe | --- |
| 132---------- Dedrick | VIIe | --- |

TABLE 5.--LAND CAPABILITY--Continued

| Soil name and map symbol | Land capability | |
|---|---|---|
| | N | I |
| 133: | | |
| Dedrick | VIIe | --- |
| Rock outcrop | VIII | --- |
| 134--- Demogul | VIIe | --- |
| 136: | | |
| Dougcity | VIIe | --- |
| Dedrick | VIIe | --- |
| 137: | | |
| Dougcity | VIIe | --- |
| Demogul | VIIe | --- |
| 138, 139--- Dubakella | VIe | --- |
| 140, 141--- Dubakella | VIIe | --- |
| 142--- Etsel | VIIe | --- |
| 143: | | |
| Etsel | VIIe | --- |
| Bamtush | VIIe | --- |
| 144: | | |
| Etsel | VIIe | --- |
| Weitchpec | VIIe | --- |
| 145: | | |
| Goulding | VIIe | --- |
| Holkat Variant | VIIe | --- |
| Marpa Variant | VIIe | --- |
| 146: | | |
| Goulding | VIIe | --- |
| Vitzthum | VIIe | --- |
| Vanvor | VIIe | --- |
| 147--- Haploxerolls | IVs | IVs |
| 148--- Haploxerolls | IVe | --- |
| 149--- Haysum | IIIe | IIIe |

TABLE 5.--LAND CAPABILITY--Continued

| Soil name and map symbol | Land capability | |
|---|---|---|
| | N | I |
| 150---------- Haysum | IIIs | IIIs |
| 151, 152---------- Haysum | IIIe | IIIe |
| 153: | | |
| Holkat---------- | VIe | --- |
| Hoosimbim---------- | VIe | --- |
| 154: | | |
| Holkat---------- | VIIe | --- |
| Hoosimbim---------- | VIIe | --- |
| 155: | | |
| Holkat Variant---------- | VIIe | --- |
| Dedrick---------- | VIIe | --- |
| 156---------- Hoosimbim | VIe | --- |
| 157: | | |
| Hoosimbim---------- | VIe | --- |
| Bamtush---------- | VIe | --- |
| Marpa---------- | VIe | --- |
| 158: | | |
| Hoosimbim---------- | VIe | --- |
| Etsel---------- | VIIe | --- |
| 159: | | |
| Hoosimbim---------- | VIIe | --- |
| Goulding---------- | VIIe | --- |
| 160, 161---------- Hotaw | VIe | --- |
| 162: | | |
| Indleton---------- | VIIe | --- |
| Caris---------- | VIIe | --- |
| Hoosimbim---------- | VIIe | --- |
| 163---------- Jafa | IIIe | IIe |
| 164---------- Jafa | IIIe | IIIe |
| 165---------- Jafa | IIIs | --- |

TABLE 5.--LAND CAPABILITY--Continued

| Soil name and map symbol | Land capability | |
|---|---|---|
| | N | I |
| 166--- Jafa | IIIe | --- |
| 167--- Jafa | IVe | --- |
| 170: | | |
| Marpa--- | VIe | --- |
| Hoosimbim--- | VIe | --- |
| 171: | | |
| Marpa--- | VIIe | --- |
| Hoosimbim--- | VIIe | --- |
| Bamtush--- | VIIe | --- |
| 172: | | |
| Marpa--- | VIIe | --- |
| Vitzthum--- | VIIe | --- |
| 173: | | |
| Marpa Variant--- | VIe | --- |
| Goulding--- | VIe | --- |
| Holkat Variant--- | VIIe | --- |
| 175--- Millsholm | VIe | --- |
| 176: | | |
| Millsholm--- | VIe | --- |
| Azule--- | IVe | --- |
| 177--- Minersville | VIIe | --- |
| 178: | | |
| Minersville Variant--- | VIIe | --- |
| Choop--- | VIIe | --- |
| 179--- Musserhill | IVe | --- |
| 180--- Musserhill | VIe | --- |
| 181: | | |
| Musserhill--- | IVe | --- |
| Weaverville--- | IVe | --- |
| 182: | | |
| Musserhill--- | VIe | --- |
| Weaverville--- | VIe | --- |

TABLE 5.--LAND CAPABILITY--Continued

| Soil name and map symbol | Land capability | |
|---|---|---|
| | N | I |
| 183: | | |
| Musserhill | IVe | --- |
| Weaverville | IVe | --- |
| Urban land | VIII | --- |
| 184--- Musserhill Variant | VIe | --- |
| 185: | | |
| Pardaloe | VIIe | --- |
| Dedrick | VIIe | --- |
| 186: | | |
| Pardaloe | VIIe | --- |
| Goulding | VIIe | --- |
| 188--- Rock outcrop | VIII | --- |
| 189: | | |
| Rock outcrop | VIII | --- |
| Dedrick | VIIe | --- |
| 190--- Sheetiron | VIIe | --- |
| 191: | | |
| Sheetiron | VIIe | --- |
| Barpeak | VIIe | --- |
| 192: | | |
| Sheetiron Variant | VIIe | --- |
| Dedrick | VIIe | --- |
| 193--- Skyrock | VIIe | --- |
| 194: | | |
| Skyrock | VIIe | --- |
| Rock outcrop | VIII | --- |
| 195: | | |
| Skyrock Variant | VIe | --- |
| Rock outcrop | VIII | --- |
| 196: | | |
| Skyrock Variant | VIIe | --- |
| Rock outcrop | VIII | --- |
| Rubble land | VIII | --- |

TABLE 5.--LAND CAPABILITY--Continued

| Soil name and map symbol | Land capability | |
|---|---|---|
| | N | I |
| 197: | | |
| Springgulch | VIe | --- |
| Brockgulch Variant | VIe | --- |
| 198: | | |
| Tallowbox | VIIe | --- |
| Minersville | VIe | --- |
| 199: | | |
| Tallowbox | VIIe | --- |
| Minersville | VIIe | --- |
| 201: | | |
| Urban land | VIII | --- |
| Xeralfs | VIIs | --- |
| 202: | | |
| Valcreek | VIIe | --- |
| Choop | VIIe | --- |
| 203: | | |
| Valcreek | VIIe | --- |
| Minersville | VIIe | --- |
| 204: | | |
| Valcreek | VIIe | --- |
| Minersville | VIIe | --- |
| Choop | VIIe | --- |
| 205: | | |
| Vanvor | VIe | --- |
| Hoosimbim | VIe | --- |
| 206: | | |
| Vanvor | VIIe | --- |
| Hoosimbim | VIIe | --- |
| 207: | | |
| Vitzthum | VIIe | --- |
| Cargent | VIIe | --- |
| 208--Weaverville | IVe | --- |
| 209--Weaverville | VIe | --- |
| 210: | | |
| Weitchpec | VIIe | --- |

TABLE 5.--LAND CAPABILITY--Continued

| Soil name and map symbol | Land capability | |
|---|---|---|
| | N | I |
| 210: | | |
| Dubakella | VIe | --- |
| 211: | | |
| Weitchpec Variant | VIe | --- |
| Bamtush Variant very gravelly loam | VIe | --- |
| Bamtush Variant loam | IVe | --- |
| 212: | | |
| Weitchpec Variant | VIIe | --- |
| Bamtush Variant | VIIe | --- |
| 213: | | |
| Xeralfs | VIIe | --- |
| Xerorthents | VIIe | --- |
| 215--Xererts | IIIe | --- |
| 216: | | |
| Xererts | IIIe | --- |
| Haysum | IIIe | IIIe |
| 217: | | |
| Xerofluvents | VIIw | --- |
| Riverwash | VIIs | --- |
| 218: | | |
| Xerorthents | VIIs | --- |
| Rock outcrop | VIII | --- |
| 219: | | |
| Xerorthents | VIIe | --- |
| Rock outcrop | VIII | --- |

TABLE 6.--WOODLAND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that data were not available)

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 101---------- Atter | 8F | Ponderosa pine---------- | 109 | 90-128 |
| | | Pacific madrone---------- | --- | --- |
| | | Douglas-fir---------- | --- | --- |
| 102: | | | | |
| Atter---------- | 8F | Ponderosa pine---------- | 109 | 90-128 |
| | | Pacific madrone---------- | --- | --- |
| | | Douglas-fir---------- | --- | --- |
| Dumps. | | | | |
| Xerofluvents. | | | | |
| 103: | | | | |
| Bamtush---------- | 8F | Douglas-fir---------- | 123 | 112-138 |
| | | Sugar pine---------- | --- | --- |
| | | Ponderosa pine---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Pacific madrone---------- | --- | --- |
| Brownbear---------- | 5F | Douglas-fir---------- | 94 | 89-98 |
| | | Sugar pine---------- | --- | --- |
| | | Canyon live oak---------- | --- | --- |
| | | Pacific madrone---------- | --- | --- |
| | | Ponderosa pine---------- | --- | --- |
| 104: | | | | |
| Bamtush---------- | 8R | Douglas-fir---------- | 123 | 112-138 |
| | | Ponderosa pine---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Sugar pine---------- | --- | --- |
| | | Pacific madrone---------- | --- | --- |
| Brownbear---------- | 5R | Douglas-fir---------- | 94 | 89-98 |
| | | Sugar pine---------- | --- | --- |
| | | Canyon live oak---------- | --- | --- |
| | | Pacific madrone---------- | --- | --- |
| | | Ponderosa pine---------- | --- | --- |
| 105: | | | | |
| Bamtush---------- | 8R | Douglas-fir---------- | 123 | 112-138 |
| | | Ponderosa pine---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Sugar pine---------- | --- | --- |
| | | Pacific madrone---------- | --- | --- |
| Brownbear---------- | 5R | Douglas-fir---------- | 94 | 89-98 |
| | | Sugar pine---------- | --- | --- |
| | | Canyon live oak---------- | --- | --- |
| | | Pacific madrone---------- | --- | --- |
| | | Ponderosa pine---------- | --- | --- |
| Weaverville---------- | 7R | Douglas-fir---------- | 107* | 91-134 |
| | | Sugar pine---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Ponderosa pine---------- | --- | --- |

See footnote at end of table.

TABLE 6.--WOODLAND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 106: | | | | |
| Bamtush | 8F | Douglas-fir | 123 | 112-138 |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Ponderosa pine | --- | --- |
| | | Pacific madrone | --- | --- |
| Weaverville | 7A | Douglas-fir | 107* | 91-134 |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Ponderosa pine | --- | --- |
| | | Pacific madrone | --- | --- |
| 107: | | | | |
| Bamtush | 8R | Douglas-fir | 123 | 112-138 |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Ponderosa pine | --- | --- |
| | | Pacific madrone | --- | --- |
| Weaverville | 7A | Douglas-fir | 107 | 91-134 |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Ponderosa pine | --- | --- |
| Brownbear | 5R | Douglas-fir | 94 | 89-98 |
| | | Sugar pine | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Pacific madrone | --- | --- |
| | | Ponderosa pine | --- | --- |
| 109: | | | | |
| Barpeak | 8R | Douglas-fir | 116 | 106-127 |
| | | Sugar pine | --- | --- |
| | | Ponderosa pine | 110 | --- |
| | | Canyon live oak | --- | --- |
| | | California black oak | --- | --- |
| Sheetiron | 7R | Ponderosa pine | 104* | 91-119 |
| | | Douglas-fir | 80 | --- |
| | | Sugar pine | --- | --- |
| | | Canyon live oak | --- | --- |
| | | California black oak | --- | --- |
| 110: | | | | |
| Beargulch | 9R | Douglas-fir | 127 | 108-145 |
| | | White fir | 68 | 47-86 |
| Skyrock. | | | | |
| 111: | | | | |
| Brockgulch | 1R | Canyon live oak | --- | --- |
| | | Digger pine | --- | --- |
| Dedrick. | | | | |

See footnote at end of table.

TABLE 6.--WOODLAND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 111: | | | | |
| Brownbear | 5R | Douglas-fir | 94 | 89-98 |
| | | Sugar pine | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Pacific madrone | --- | --- |
| | | Ponderosa pine | --- | --- |
| 112: | | | | |
| Brownbear | 5R | Douglas-fir | 94 | 89-98 |
| | | Sugar pine | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Pacific madrone | --- | --- |
| | | Ponderosa pine | --- | --- |
| Bamtush | 8R | Douglas-fir | 123 | 112-138 |
| | | Sugar pine | --- | --- |
| | | Ponderosa pine | --- | --- |
| | | California black oak | --- | --- |
| | | Pacific madrone | --- | --- |
| 113----------<br>Brownscreek | 8R | Ponderosa pine | 104 | 101-109 |
| | | Pacific madrone | --- | --- |
| | | California black oak | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Douglas-fir | 119 | 82-149 |
| 114----------<br>Brownscreek | 8R | Ponderosa pine | 104 | 101-109 |
| | | Pacific madrone | --- | --- |
| | | California black oak | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Douglas-fir | 119 | 82-149 |
| 115: | | | | |
| Brownscreek | 8R | Ponderosa pine | 104 | 101-109 |
| | | Pacific madrone | --- | --- |
| | | California black oak | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Douglas-fir | 119 | 82-149 |
| Dedrick. | | | | |
| 116: | | | | |
| Brownscreek | 8R | Ponderosa pine | 104 | 101-109 |
| | | Pacific madrone | --- | --- |
| | | California black oak | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Douglas-fir | 119 | 82-149 |
| Dougcity | 7R | Douglas-fir | 115* | 102-126 |
| | | Sugar pine | --- | --- |
| | | Pacific madrone | --- | --- |
| | | California black oak | --- | --- |
| 117: | | | | |
| Brownscreek | 8R | Ponderosa pine | 104 | 101-109 |
| | | Pacific madrone | --- | --- |
| | | California black oak | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Douglas-fir | 119 | 82-149 |

See footnote at end of table.

TABLE 6.--WOODLAND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 117: | | | | |
| Dougcity | 7R | Douglas-fir | 115* | 102-126 |
| | | Sugar pine | --- | --- |
| | | Pacific madrone | --- | --- |
| | | California black oak | --- | --- |
| 118: | | | | |
| Cargent. | | | | |
| Demogul | 6R | Douglas-fir | 106 | 92-116 |
| | | Ponderosa pine | --- | --- |
| | | Pacific madrone | --- | --- |
| | | California black oak | --- | --- |
| 119: | | | | |
| Cargent. | | | | |
| Demogul | 6R | Douglas-fir | 106 | 92-116 |
| | | Ponderosa pine | --- | --- |
| | | Pacific madrone | --- | --- |
| | | California black oak | --- | --- |
| 120 | 6R | Douglas-fir | 101* | 88-110 |
| Caris | | Ponderosa pine | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Sugar pine | --- | --- |
| 121 | 6R | Douglas-fir | 101* | 88-110 |
| Caris | | Ponderosa pine | 98 | 80-123 |
| | | Canyon live oak | --- | --- |
| | | Sugar pine | --- | --- |
| 122: | | | | |
| Caris | 6R | Douglas-fir | 101* | 88-110 |
| | | Ponderosa pine | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Sugar pine | --- | --- |
| | | Pacific madrone | --- | --- |
| Indleton | 9R | Douglas-fir | 127 | 116-135 |
| | | Sugar pine | --- | --- |
| | | Pacific madrone | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Pacific dogwood | --- | --- |
| Hoosimbim | 6R | Douglas-fir | 102* | 94-111 |
| | | Ponderosa pine | --- | --- |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Pacific madrone | --- | --- |
| 123 | 1F | Oregon white oak | --- | --- |
| Carrcreek | | Ponderosa pine | --- | --- |
| 124 | 1F | Oregon white oak | --- | --- |
| Carrcreek | | Ponderosa pine | --- | --- |
| 127 | 1C | Oregon white oak | --- | --- |
| Crefork | | California black oak | --- | --- |

See footnote at end of table.

TABLE 6.--WOODLAND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 128---------- Crefork | 1C | Oregon white oak---------- | --- | --- |
| | | California black oak------ | --- | --- |
| 129---------- Crefork | 1C | Oregon white oak---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Digger pine--------------- | --- | --- |
| 131: | | | | |
| Crefork---------- | 1R | Oregon white oak---------- | --- | --- |
| | | California black oak------ | --- | --- |
| Musserhill---------- | 1R | Oregon white oak---------- | --- | --- |
| | | Digger pine--------------- | --- | --- |
| 134---------- Demogul | 6R | Douglas-fir--------------- | 106 | 92-116 |
| | | Ponderosa pine------------ | --- | --- |
| | | Pacific madrone----------- | --- | --- |
| | | California black oak------ | --- | --- |
| 136: | | | | |
| Dougcity---------- | 7R | Douglas-fir--------------- | 115* | 102-126 |
| | | Sugar pine---------------- | --- | --- |
| | | Pacific madrone----------- | --- | --- |
| | | California black oak------ | --- | --- |
| Dedrick. | | | | |
| 137: | | | | |
| Dougcity---------- | 7R | Douglas-fir--------------- | 115* | 102-126 |
| | | Sugar pine---------------- | --- | --- |
| | | Pacific madrone----------- | --- | --- |
| | | California black oak------ | --- | --- |
| Demogul---------- | 6R | Douglas-fir--------------- | 106 | 92-116 |
| | | Ponderosa pine------------ | --- | --- |
| | | Pacific madrone----------- | --- | --- |
| | | California black oak------ | --- | --- |
| 138---------- Dubakella | 4T | Jeffrey pine-------------- | 71 | 65-76 |
| | | Incense cedar------------- | --- | --- |
| | | Douglas-fir--------------- | --- | --- |
| 139---------- Dubakella | 4R | Jeffrey pine-------------- | 71 | 65-76 |
| | | Incense cedar------------- | --- | --- |
| | | Douglas-fir--------------- | --- | --- |
| 140---------- Dubakella | 4R | Jeffrey pine-------------- | 71 | 65-76 |
| | | Incense cedar------------- | --- | --- |
| | | Douglas-fir--------------- | --- | --- |
| 141---------- Dubakella | 1R | Oregon white oak---------- | --- | --- |
| | | Digger pine--------------- | --- | --- |

See footnote at end of table.

TABLE 6.--WOODLAND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 143: | | | | |
| Etsel. | | | | |
| Bamtush | 8R | Douglas-fir | 123 | 112-138 |
| | | Sugar pine | --- | --- |
| | | Ponderosa pine | --- | --- |
| | | California black oak | --- | --- |
| | | Pacific madrone | --- | --- |
| 144: | | | | |
| Etsel. | | | | |
| Weitchpec | 5R | Douglas-fir | 81 | --- |
| | | Incense cedar | --- | --- |
| | | Digger pine | --- | --- |
| | | California black oak | --- | --- |
| | | Jeffrey pine | --- | --- |
| | | Sugar pine | --- | --- |
| 145: | | | | |
| Goulding | 1R | Canyon live oak | --- | --- |
| | | Oregon white oak | --- | --- |
| | | Digger pine | --- | --- |
| Holkat Variant | 1R | Oregon white oak | --- | --- |
| | | California black oak | --- | --- |
| | | Digger pine | --- | --- |
| Marpa Variant | 5R | Ponderosa pine | 83 | 82-84 |
| | | Oregon white oak | --- | --- |
| | | California black oak | --- | --- |
| | | Douglas-fir | --- | --- |
| | | Canyon live oak | --- | --- |
| 146: | | | | |
| Goulding | 1R | Canyon live oak | --- | --- |
| | | Oregon white oak | --- | --- |
| | | Digger pine | --- | --- |
| Vitzthum. | | | | |
| Vanvor | 1R | Oregon white oak | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Digger pine | --- | --- |
| 148 | 10S | Douglas-fir | 138 | --- |
| Haploxerolls | | Ponderosa pine | --- | --- |
| | | Sugar pine | --- | --- |
| 150 | 1F | Oregon white oak | --- | --- |
| Haysum | | Ponderosa pine | --- | --- |
| 151 | 1F | Oregon white oak | --- | --- |
| Haysum | | Ponderosa pine | --- | --- |

See footnote at end of table.

TABLE 6.--WOODLAND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 153: | | | | |
| Holkat | 5R | Douglas-fir | 87 | 78-102 |
| | | California black oak | --- | --- |
| | | White fir | --- | --- |
| | | Sugar pine | --- | --- |
| | | Pacific dogwood | --- | --- |
| Hoosimbim | 6R | Douglas-fir | 102* | 94-111 |
| | | Ponderosa pine | --- | --- |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Pacific madrone | --- | --- |
| 154: | | | | |
| Holkat | 5R | Douglas-fir | 87 | 78-102 |
| | | California black oak | --- | --- |
| | | White fir | --- | --- |
| | | Sugar pine | --- | --- |
| | | Pacific dogwood | --- | --- |
| Hoosimbim | 6R | Douglas-fir | 102* | 94-111 |
| | | Ponderosa pine | --- | --- |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Pacific madrone | --- | --- |
| 155: | | | | |
| Holkat Variant | 1R | Oregon white oak | --- | --- |
| | | California black oak | --- | --- |
| | | Digger pine | --- | --- |
| Dedrick. | | | | |
| 156 | 6R | Douglas-fir | 102* | 94-111 |
| Hoosimbim | | Sugar pine | --- | --- |
| | | Ponderosa pine | --- | --- |
| | | California black oak | --- | --- |
| | | Pacific madrone | --- | --- |
| 157: | | | | |
| Hoosimbim | 6R | Douglas-fir | 102* | 94-111 |
| | | Ponderosa pine | --- | --- |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Pacific madrone | --- | --- |
| Bamtush | 8R | Douglas-fir | 123 | 112-138 |
| | | Sugar pine | --- | --- |
| | | Ponderosa pine | --- | --- |
| | | California black oak | --- | --- |
| | | Pacific madrone | --- | --- |
| | | Canyon live oak | --- | --- |
| Marpa | 4R | Ponderosa pine | 63 | 61-65 |
| | | Douglas-fir | 78 | 73-80 |
| | | Sugar pine | --- | --- |
| | | Canyon live oak | --- | --- |
| | | California black oak | --- | --- |

See footnote at end of table.

TABLE 6.--WOODLAND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 158: | | | | |
| Hoosimbim | 6R | Douglas-fir | 102* | 94-111 |
| | | Ponderosa pine | --- | --- |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Pacific madrone | --- | --- |
| Etsel. | | | | |
| 159: | | | | |
| Hoosimbim | 6R | Douglas-fir | 102* | 94-111 |
| | | Ponderosa pine | --- | --- |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Pacific madrone | --- | --- |
| Goulding | 1R | Canyon live oak | --- | --- |
| | | Oregon white oak | --- | --- |
| | | Digger pine | --- | --- |
| 160 | 5A | Douglas-fir | 96 | 82-106 |
| Hotaw | | Ponderosa pine | --- | --- |
| | | California black oak | --- | --- |
| | | Oregon white oak | --- | --- |
| 161 | 5R | Douglas-fir | 96 | 82-106 |
| Hotaw | | Ponderosa pine | --- | --- |
| | | California black oak | --- | --- |
| | | Oregon white oak | --- | --- |
| 162: | | | | |
| Indleton | 9R | Douglas-fir | 127 | 116-135 |
| | | Sugar pine | --- | --- |
| | | Pacific madrone | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Pacific dogwood | --- | --- |
| Caris | 6R | Douglas-fir | 101* | 88-110 |
| | | Ponderosa pine | 98 | 80-123 |
| | | Canyon live oak | --- | --- |
| | | Sugar pine | --- | --- |
| Hoosimbim | 6R | Douglas-fir | 102* | 94-111 |
| | | Ponderosa pine | --- | --- |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Pacific madrone | --- | --- |
| 163 | 5A | Ponderosa pine | 81 | --- |
| Jafa | | Oregon white oak | --- | --- |
| 164 | 5A | Ponderosa pine | 81 | --- |
| Jafa | | Oregon white oak | --- | --- |
| 165 | 7F | Ponderosa pine | 96 | 75-113 |
| Jafa | | Oregon white oak | --- | --- |
| | | Douglas-fir | --- | --- |

See footnote at end of table.

TABLE 6.--WOODLAND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 166---------- Jafa | 7F | Ponderosa pine---------- | 96 | 75-113 |
| | | Oregon white oak---------- | --- | --- |
| | | Douglas-fir---------- | --- | --- |
| 167---------- Jafa | 8F | Ponderosa pine---------- | 104 | --- |
| | | Douglas-fir---------- | --- | --- |
| | | Oregon white oak---------- | --- | --- |
| 170: | | | | |
| Marpa---------- | 4R | Ponderosa pine---------- | 63 | 61-65 |
| | | Douglas-fir---------- | 78 | 73-80 |
| | | Sugar pine---------- | --- | --- |
| | | Canyon live oak---------- | --- | --- |
| | | California black oak------ | --- | --- |
| Hoosimbim---------- | 6R | Douglas-fir---------- | 102* | 94-111 |
| | | Ponderosa pine---------- | --- | --- |
| | | Sugar pine---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Pacific madrone---------- | --- | --- |
| 171: | | | | |
| Marpa---------- | 4R | Ponderosa pine---------- | 63 | 61-65 |
| | | Douglas-fir---------- | 78 | 73-80 |
| | | Sugar pine---------- | --- | --- |
| | | Canyon live oak---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Pacific madrone---------- | --- | --- |
| Hoosimbim---------- | 6R | Douglas-fir---------- | 102* | 94-111 |
| | | Ponderosa pine---------- | --- | --- |
| | | Sugar pine---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Pacific madrone---------- | --- | --- |
| Bamtush---------- | 8R | Douglas-fir---------- | 123 | 112-138 |
| | | Sugar pine---------- | --- | --- |
| | | Ponderosa pine---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Pacific madrone---------- | --- | --- |
| 172: | | | | |
| Marpa---------- | 4R | Ponderosa pine---------- | 63 | 61-65 |
| | | Douglas-fir---------- | 78 | 73-80 |
| | | Sugar pine---------- | --- | --- |
| | | Canyon live oak---------- | --- | --- |
| Vitzthum. | | | | |
| 173: | | | | |
| Marpa Variant---------- | 5R | Ponderosa pine---------- | 83 | 82-84 |
| | | Oregon white oak---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Douglas-fir---------- | --- | --- |
| | | Canyon live oak---------- | --- | --- |

See footnote at end of table.

TABLE 6.--WOODLAND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 173: | | | | |
| | | Oregon white oak---------- | --- | --- |
| | | Digger pine---------- | --- | --- |
| Holkat Variant---------- | 1R | Oregon white oak---------- | --- | --- |
| | | Ponderosa pine---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Digger pine---------- | --- | --- |
| 175---------- | 1D | Blue oak---------- | --- | --- |
| Millsholm | | Digger pine---------- | --- | --- |
| 176: | | | | |
| Millsholm---------- | 1D | Blue oak---------- | --- | --- |
| | | Digger pine---------- | --- | --- |
| Azule---------- | 1C | Blue oak---------- | --- | --- |
| | | Digger pine---------- | --- | --- |
| 177---------- | 7R | Douglas-fir---------- | 101* | 96-111 |
| Minersville | | Ponderosa pine---------- | --- | --- |
| | | Sugar pine---------- | --- | --- |
| | | White fir---------- | --- | --- |
| | | California black oak------ | --- | --- |
| 178: | | | | |
| Minersville Variant----- | 7R | White fir---------- | 52 | 46-58 |
| | | California red fir-------- | --- | --- |
| Choop. | | | | |
| 179---------- | 1F | Oregon white oak---------- | --- | --- |
| Musserhill | | Digger pine---------- | --- | --- |
| 180---------- | 1R | Oregon white oak---------- | --- | --- |
| Musserhill | | Digger pine---------- | --- | --- |
| 181: | | | | |
| Musserhill---------- | 1F | Oregon white oak---------- | --- | --- |
| | | Digger pine---------- | --- | --- |
| Weaverville---------- | 7A | Douglas-fir---------- | 107* | 102-112 |
| | | Sugar pine---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Ponderosa pine---------- | --- | --- |
| 182: | | | | |
| Musserhill---------- | 1R | Oregon white oak---------- | --- | --- |
| | | Digger pine---------- | --- | --- |
| Weaverville---------- | 7R | Douglas-fir---------- | 107* | 102-112 |
| | | Sugar pine---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Ponderosa pine---------- | --- | --- |
| 183: | | | | |
| Musserhill---------- | 1F | Oregon white oak---------- | --- | --- |
| | | Digger pine---------- | --- | --- |

See footnote at end of table.

TABLE 6.--WOODLAND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 183: | | | | |
| Weaverville | 7A | Douglas-fir | 107* | 102-112 |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Ponderosa pine | --- | --- |
| Urban land. | | | | |
| 184--- Musserhill Variant | 1R | Blue oak | --- | --- |
| 185: | | | | |
| Pardaloe | 7R | Douglas-fir | 114* | 102-126 |
| | | Ponderosa pine | --- | --- |
| | | Oregon white oak | --- | --- |
| | | Pacific madrone | --- | --- |
| Dedrick. | | | | |
| 186: | | | | |
| Pardaloe | 7R | Douglas-fir | 114* | 102-126 |
| | | Ponderosa pine | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Sugar pine | --- | --- |
| | | Pacific dogwood | --- | --- |
| Goulding | 1R | Canyon live oak | --- | --- |
| | | Oregon white oak | --- | --- |
| 190--- Sheetiron | 7R | Ponderosa pine | 104* | 91-119 |
| | | Douglas-fir | 80 | --- |
| | | Sugar pine | --- | --- |
| | | Canyon live oak | --- | --- |
| | | California black oak | --- | --- |
| 191: | | | | |
| Sheetiron | 7R | Ponderosa pine | 104* | 91-119 |
| | | Douglas-fir | 80 | --- |
| | | Sugar pine | --- | --- |
| | | Canyon live oak | --- | --- |
| | | California black oak | --- | --- |
| Barpeak | 8R | Douglas-fir | 116 | 106-127 |
| | | Sugar pine | --- | --- |
| | | Ponderosa pine | 110 | --- |
| | | Canyon live oak | --- | --- |
| | | California black oak | --- | --- |
| 192: | | | | |
| Sheetiron Variant | 1R | Oregon white oak | --- | --- |
| | | California black oak | --- | --- |
| | | Douglas-fir | --- | --- |
| | | Ponderosa pine | --- | --- |
| Dedrick. | | | | |

See footnote at end of table.

TABLE 6.--WOODLAND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 195: | | | | |
| Skyrock Variant--------- | 5R | California red fir-------- | 21 | --- |
| | | Western white pine-------- | 34 | --- |
| Rock outcrop. | | | | |
| 196: | | | | |
| Skyrock Variant--------- | 5R | California red fir-------- | 21 | --- |
| | | Western white pine-------- | 34 | --- |
| Rock outcrop. | | | | |
| Rubble land. | | | | |
| 198: | | | | |
| Tallowbox--------------- | 6R | Ponderosa pine------------ | 89* | 71-111 |
| | | Douglas-fir--------------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Sugar pine---------------- | --- | --- |
| Minersville------------- | 7R | Douglas-fir--------------- | 101* | 96-111 |
| | | Ponderosa pine------------ | --- | --- |
| | | Sugar pine---------------- | --- | --- |
| | | White fir----------------- | --- | --- |
| | | California black oak------ | --- | --- |
| 199: | | | | |
| Tallowbox--------------- | 6R | Ponderosa pine------------ | 89* | 71-111 |
| | | Douglas-fir--------------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Sugar pine---------------- | --- | --- |
| Minersville------------- | 7R | Douglas-fir--------------- | 101* | 96-111 |
| | | Ponderosa pine------------ | --- | --- |
| | | Sugar pine---------------- | --- | --- |
| | | White fir----------------- | --- | --- |
| | | California black oak------ | --- | --- |
| 202: | | | | |
| Valcreek---------------- | 4R | Ponderosa pine------------ | 75* | 70-86 |
| | | Canyon live oak----------- | --- | --- |
| | | Douglas-fir--------------- | --- | --- |
| | | Sugar pine---------------- | --- | --- |
| Choop. | | | | |
| 203: | | | | |
| Valcreek---------------- | 4R | Ponderosa pine------------ | 75* | 70-86 |
| | | Canyon live oak----------- | --- | --- |
| | | Douglas-fir--------------- | --- | --- |
| | | Sugar pine---------------- | --- | --- |
| Minersville------------- | 7R | Douglas-fir--------------- | 101* | 96-111 |
| | | Ponderosa pine------------ | --- | --- |
| | | Sugar pine---------------- | --- | --- |
| | | White fir----------------- | --- | --- |
| | | California black oak------ | --- | --- |

See footnote at end of table.

TABLE 6.--WOODLAND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 204: | | | | |
| Valcreek | 4R | Ponderosa pine | 75* | 70-86 |
| | | Canyon live oak | --- | --- |
| | | Douglas-fir | --- | --- |
| | | Sugar pine | --- | --- |
| Minersville | 7R | Douglas-fir | 101* | 96-111 |
| | | Ponderosa pine | --- | --- |
| | | Sugar pine | --- | --- |
| | | White fir | --- | --- |
| | | California black oak | --- | --- |
| Choop. | | | | |
| 205: | | | | |
| Vanvor | 1R | Oregon white oak | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Digger pine | --- | --- |
| Hoosimbim | 6R | Douglas-fir | 102* | 94-111 |
| | | Ponderosa pine | --- | --- |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Pacific madrone | --- | --- |
| 206: | | | | |
| Vanvor | 1R | Oregon white oak | --- | --- |
| | | Canyon live oak | --- | --- |
| | | Digger pine | --- | --- |
| Hoosimbim | 6R | Douglas-fir | 102* | 94-111 |
| | | Ponderosa pine | --- | --- |
| | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Pacific madrone | --- | --- |
| 208 | 7A | Douglas-fir | 107* | 102-112 |
| Weaverville | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Ponderosa pine | --- | --- |
| 209 | 7R | Douglas-fir | 107* | 102-112 |
| Weaverville | | Sugar pine | --- | --- |
| | | California black oak | --- | --- |
| | | Ponderosa pine | --- | --- |
| 210: | | | | |
| Weitchpec | 5R | Douglas-fir | 81 | --- |
| | | Incense cedar | --- | --- |
| | | California black oak | --- | --- |
| | | Jeffrey pine | --- | --- |
| | | Sugar pine | --- | --- |
| Dubakella | 4R | Jeffery pine | 71 | 65-76 |
| | | Incense cedar | --- | --- |
| | | Douglas-fir | --- | --- |

See footnote at end of table.

TABLE 6.--WOODLAND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Potential productivity | | |
|---|---|---|---|---|
| | | Commonly grown trees | Site index (NRCS) | Site range |
| 211: | | | | |
| Weitchpec Variant------- | 6R | Douglas-fir---------- | 100 | --- |
| | | Ponderosa pine------- | --- | --- |
| | | Sugar pine---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Incense cedar------- | --- | --- |
| Bamtush Variant very gravelly loam---------- | 6R | Douglas-fir---------- | 101 | 100-102 |
| | | Sugar pine---------- | --- | --- |
| | | Ponderosa pine------- | --- | --- |
| | | Incense cedar------- | --- | --- |
| | | California black oak------ | --- | --- |
| Bamtush Variant loam---- | 6F | Douglas-fir---------- | 101 | 100-102 |
| | | Sugar pine---------- | --- | --- |
| | | Ponderosa pine------- | --- | --- |
| | | Incense cedar------- | --- | --- |
| | | California black oak------ | --- | --- |
| 212: | | | | |
| Weitchpec Variant------- | 6R | Douglas-fir---------- | 100 | --- |
| | | Ponderosa pine------- | --- | --- |
| | | Sugar pine---------- | --- | --- |
| | | California black oak------ | --- | --- |
| | | Incense cedar------- | --- | --- |
| Bamtush Variant--------- | 6R | Douglas-fir---------- | 101 | 100-102 |
| | | Sugar pine---------- | --- | --- |
| | | Ponderosa pine------- | --- | --- |
| | | Incense cedar------- | --- | --- |
| | | California black oak------ | --- | --- |

* Site index is a summary of five or more measurements on this soil.

TABLE 7.--WOODLAND MANAGEMENT CONCERNS

(See text for definitions of "slight," "moderate," and "severe." Only the soils suitable for production of commerc
listed. Absence of an entry indicates that data were not available)

| Soil name and map symbol | Seedling mortality | Plant competition | Limitation for revegetating exposed subsoil with-- | | Equipment limitation | Hazard of soil damage from-- | | Hazard of sheet when logs ar |
|---|---|---|---|---|---|---|---|---|
| | | | Grasses | Trees | | Fire | Compaction | Tractor |
| 101----------<br>Atter | Severe | Moderate | Slight | Moderate | Slight | Moderate | Slight | Slight |
| 102: | | | | | | | | |
| Atter---------- | Severe | Moderate | Slight | Moderate | Slight | Moderate | Slight | Slight |
| Dumps. | | | | | | | | |
| Xerofluvents. | | | | | | | | |
| 103: | | | | | | | | |
| Bamtush---------- | Severe | Moderate | Moderate | Severe | Slight | Moderate | Slight | Slight |
| Brownbear---------- | Severe | Moderate | Moderate | Severe | Slight | Slight | Slight | Slight |
| 104: | | | | | | | | |
| Bamtush---------- | Severe | Moderate | Severe | Severe | Severe | Severe | Slight | Moderate |
| Brownbear---------- | Severe | Slight | Moderate | Severe | Severe | Moderate | Slight | Moderate |
| 105: | | | | | | | | |
| Bamtush---------- | Severe | Moderate | Severe | Severe | Severe | Severe | Slight | Moderate |
| Brownbear---------- | Severe | Moderate | Moderate | Severe | Severe | Moderate | Slight | Moderate |
| Weaverville--------- | Moderate | Severe | Slight | Slight | Severe | Moderate | Moderate | Severe |
| 106: | | | | | | | | |
| Bamtush---------- | Severe | Moderate | Severe | Severe | Slight | Moderate | Slight | Slight |
| Weaverville--------- | Moderate | Severe | Slight | Slight | Moderate | Slight | Moderate | Slight |
| 107: | | | | | | | | |
| Bamtush---------- | Severe | Moderate | Severe | Severe | Moderate | Severe | Slight | Slight |
| Weaverville--------- | Moderate | Severe | Slight | Slight | Moderate | Slight | Moderate | Moderate |
| Brownbear---------- | Severe | Moderate | Moderate | Severe | Moderate | Moderate | Slight | Slight |
| 109: | | | | | | | | |
| Barpeak---------- | Severe | Moderate | Moderate | Severe | Severe | Moderate | Slight | Severe |

TABLE 7.--WOODLAND MANAGEMENT CONCERNS--Continued

| Soil name and map symbol | Seedling mortality | Plant competition | Limitation for revegetating exposed subsoil with-- | | Equipment limitation | Hazard of soil damage from-- | | Hazard of sheet when logs ar |
|---|---|---|---|---|---|---|---|---|
| | | | Grasses | Trees | | Fire | Compaction | Tractor |
| 109: | | | | | | | | |
| Sheetiron | Severe | Moderate | Moderate | Severe | Severe | Moderate | Slight | Severe |
| 110: | | | | | | | | |
| Beargulch | Severe | Moderate | Moderate | Moderate | Severe | Moderate | Slight | Moderate |
| Skyrock. | | | | | | | | |
| 111: | | | | | | | | |
| Brockgulch | Severe | Moderate | Moderate | Severe | Severe | Moderate | Slight | Moderate |
| Dedrick. | | | | | | | | |
| Brownbear | Severe | Moderate | Moderate | Severe | Severe | Moderate | Slight | Moderate |
| 112: | | | | | | | | |
| Brownbear | Severe | Slight | Moderate | Severe | Moderate | Moderate | Slight | Slight |
| Bamtush | Severe | Moderate | Moderate | Moderate | Moderate | Slight | Slight | Moderate |
| 113--Brownscreek | Moderate | Moderate | Slight | Moderate | Moderate | Slight | Moderate | Severe |
| 114--Brownscreek | Moderate | Moderate | Slight | Moderate | Severe | Moderate | Moderate | Severe |
| 115: | | | | | | | | |
| Brownscreek | Moderate | Moderate | Slight | Moderate | Severe | Moderate | Moderate | Severe |
| Dedrick. | | | | | | | | |
| 116: | | | | | | | | |
| Brownscreek | Moderate | Moderate | Slight | Moderate | Severe | Moderate | Moderate | Severe |
| Dougcity | Moderate | Moderate | Slight | Slight | Moderate | Slight | Moderate | Severe |
| 117: | | | | | | | | |
| Brownscreek | Moderate | Moderate | Slight | Moderate | Severe | Moderate | Moderate | Severe |
| Dougcity | Moderate | Moderate | Slight | Moderate | Severe | Moderate | Moderate | Severe |
| 118: | | | | | | | | |
| Cargent. | | | | | | | | |
| Demogul | Moderate | Severe | Slight | Slight | Severe | Moderate | Moderate | Severe |

TABLE 7.--WOODLAND MANAGEMENT CONCERNS--Continued

| Soil name and map symbol | Seedling mortality | Plant competition | Limitation for revegetating exposed subsoil with-- | | Equipment limitation | Hazard of soil damage from-- | | Hazard of sheet when logs ar |
|---|---|---|---|---|---|---|---|---|
| | | | Grasses | Trees | | Fire | Compaction | Tractor |
| 119: Cargent. | | | | | | | | |
| Demogul | Moderate | Severe | Slight | Moderate | Severe | Moderate | Moderate | Severe |
| 120--- Caris | Severe | Moderate | Severe | Severe | Severe | Severe | Slight | Moderate |
| 121--- Caris | Severe | Moderate | Severe | Severe | Severe | Severe | Slight | Severe |
| 122: | | | | | | | | |
| Caris | Severe | Moderate | Severe | Severe | Severe | Severe | Slight | Moderate |
| Indleton | Severe | Moderate | Moderate | Severe | Severe | Moderate | Slight | Severe |
| Hoosimbim | Severe | Moderate | Severe | Severe | Severe | Severe | Slight | Moderate |
| 123--- Carrcreek | Moderate | Severe | Slight | Severe | Slight | Slight | Slight | Slight |
| 124--- Carrcreek | Moderate | Severe. | Slight | Severe | Slight | Slight | Slight | Slight |
| 127--- Crefork | Severe | Moderate | Slight | Slight | Slight | Slight | Moderate | Slight |
| 128--- Crefork | Severe | Moderate | Slight | Slight | Slight | Slight | Moderate | Slight |
| 129--- Crefork | Severe | Moderate | Slight | Slight | Moderate | Slight | Moderate | Moderate |
| 131: | | | | | | | | |
| Crefork | Severe | Moderate | Slight | Slight | Severe | Slight | Moderate | Severe |
| Musserhill | Severe | Moderate | Slight | Moderate | Severe | Slight | Moderate | Moderate |
| 134--- Demogul | Moderate | Severe | Slight | Slight | Severe | Moderate | Moderate | Moderate |
| 136: | | | | | | | | |
| Dougcity | Moderate | Moderate | Slight | Moderate | Severe | Moderate | Moderate | Severe |
| Dedrick. | | | | | | | | |

TABLE 7.--WOODLAND MANAGEMENT CONCERNS--Continued

| Soil name and map symbol | Seedling mortality | Plant competition | Limitation for revegetating exposed subsoil with-- | | Equipment limitation | Hazard of soil damage from-- | | Hazard of sheet when logs ar |
|---|---|---|---|---|---|---|---|---|
| | | | Grasses | Trees | | Fire | Compaction | Tractor |
| 137: | | | | | | | | |
| Dougcity | Moderate | Moderate | Slight | Moderate | Severe | Moderate | Moderate | Severe |
| Demogul | Moderate | Severe | Slight | Slight | Severe | Moderate | Moderate | Severe |
| 138--- Dubakella | Severe | Moderate | Moderate | Severe | Slight | Slight | Slight | Slight |
| 139--- Dubakella | Severe | Moderate | Severe | Severe | Moderate | Slight | Slight | Moderate |
| 140--- Dubakella | Severe | Moderate | Severe | Severe | Severe | Slight | Slight | Severe |
| 141--- Dubakella | Moderate | Moderate | Severe | Severe | Severe | Slight | Moderate | Severe |
| 143: Etsel. | | | | | | | | |
| Bamtush | Severe | Moderate | Moderate | Severe | Severe | Moderate | Slight | Severe |
| 144: Etsel. | | | | | | | | |
| Weitchpec | Severe | Moderate | Moderate | Severe | Severe | Moderate | Moderate | Severe |
| 145: | | | | | | | | |
| Goulding | Severe | Moderate | Severe | Severe | Severe | Moderate | Slight | Severe |
| Holkat Variant | Slight | Moderate | Moderate | Moderate | Severe | Slight | Moderate | Severe |
| Marpa Variant | Moderate | Moderate | Slight | Moderate | Severe | Slight | Moderate | Moderate |
| 146: Goulding | Severe | Moderate | Severe | Severe | Severe | Moderate | Slight | Severe |
| Vitzthum. | | | | | | | | |
| Vanvor | Moderate | Moderate | Moderate | Severe | Severe | Moderate | Slight | Moderate |
| 148--- Haploxerolls | Moderate | Severe | Slight | Slight | Slight | Slight | Moderate | Slight |
| 150--- Haysum | Moderate | Severe | Slight | Severe | Slight | Slight | Slight | Slight |

TABLE 7.--WOODLAND MANAGEMENT CONCERNS--Continued

| Soil name and map symbol | Seedling mortality | Plant competition | Limitation for revegetating exposed subsoil with-- | | Equipment limitation | Hazard of soil damage from-- | | Hazard of sheet when logs ar |
|---|---|---|---|---|---|---|---|---|
| | | | Grasses | Trees | | Fire | Compaction | Tractor |
| 151----------<br>Haysum | Moderate | Severe | Slight | Severe | Slight | Slight | Slight | Slight |
| 153: | | | | | | | | |
| Holkat---------- | Moderate | Moderate | Slight | Moderate | Moderate | Slight | Moderate | Severe |
| Hoosimbim---------- | Moderate | Severe | Slight | Moderate | Moderate | Moderate | Slight | Severe |
| 154: | | | | | | | | |
| Holkat---------- | Moderate | Moderate | Slight | Moderate | Severe | Moderate | Moderate | Severe |
| Hoosimbim---------- | Moderate | Severe | Slight | Moderate | Severe | Moderate | Slight | Severe |
| 155: | | | | | | | | |
| Holkat Variant------<br>Dedrick. | Slight | Moderate | Moderate | Severe | Severe | Moderate | Moderate | Severe |
| 156----------<br>Hoosimbim | Moderate | Moderate | Moderate | Severe | Moderate | Moderate | Slight | Severe |
| 157: | | | | | | | | |
| Hoosimbim---------- | Severe | Moderate | Severe | Severe | Moderate | Severe | Slight | Slight |
| Bamtush---------- | Severe | Moderate | Moderate | Moderate | Moderate | Slight | Slight | Moderate |
| Marpa---------- | Moderate | Slight | Moderate | Severe | Moderate | Slight | Moderate | Slight |
| 158: | | | | | | | | |
| Hoosimbim---------- | Moderate | Severe | Slight | Moderate | Moderate | Moderate | Slight | Severe |
| Etsel. | | | | | | | | |
| 159: | | | | | | | | |
| Hoosimbim---------- | Severe | Moderate | Severe | Severe | Severe | Severe | Slight | Moderate |
| Goulding---------- | Severe | Moderate | Severe | Severe | Severe | Moderate | Slight | Severe |
| 160----------<br>Hotaw | Slight | Severe | Slight | Slight | Slight | Slight | Slight | Moderate |
| 161----------<br>Hotaw | Slight | Severe | Slight | Moderate | Moderate | Slight | Slight | Severe |
| 162: | | | | | | | | |
| Indleton---------- | Severe | Moderate | Moderate | Severe | Severe | Slight | Slight | Moderate |

TABLE 7.--WOODLAND MANAGEMENT CONCERNS--Continued

| Soil name and map symbol | Seedling mortality | Plant competition | Limitation for revegetating exposed subsoil with-- | | Equipment limitation | Hazard of soil damage from-- | | Hazard of sheet when logs ar |
|---|---|---|---|---|---|---|---|---|
| | | | Grasses | Trees | | Fire | Compaction | Tractor |
| 162: | | | | | | | | |
| Caris | Severe | Moderate | Severe | Severe | Severe | Severe | Slight | Moderate |
| Hoosimbim | Severe | Moderate | Severe | Severe | Severe | Severe | Slight | Moderate |
| 163--- Jafa | Slight | Moderate | Slight | Slight | Slight | Slight | Moderate | Slight |
| 164--- Jafa | Slight | Moderate | Slight | Slight | Slight | Slight | Moderate | Slight |
| 165--- Jafa | Slight | Severe | Slight | Slight | Slight | Slight | Moderate | Slight |
| 166--- Jafa | Slight | Severe | Slight | Slight | Slight | Slight | Moderate | Slight |
| 167--- Jafa | Slight | Severe | Slight | Slight | Slight | Slight | Moderate | Slight |
| 170: | | | | | | | | |
| Marpa | Moderate | Slight | Moderate | Severe | Moderate | Slight | Moderate | Slight |
| Hoosimbim | Severe | Moderate | Severe | Severe | Moderate | Severe | Slight | Slight |
| 171: | | | | | | | | |
| Marpa | Moderate | Slight | Moderate | Severe | Severe | Moderate | Moderate | Moderate |
| Hoosimbim | Severe | Moderate | Severe | Severe | Severe | Severe | Slight | Moderate |
| Bamtush | Severe | Moderate | Moderate | Severe | Severe | Moderate | Slight | Severe |
| 172: | | | | | | | | |
| Marpa | Moderate | Slight | Moderate | Severe | Severe | Moderate | Moderate | Moderate |
| Vitzthum. | | | | | | | | |
| 173: | | | | | | | | |
| Marpa Variant | Moderate | Moderate | Slight | Moderate | Moderate | Slight | Moderate | Slight |
| Goulding | Severe | Moderate | Severe | Severe | Severe | Moderate | Slight | Moderate |
| Holkat Variant | Slight | Moderate | Slight | Moderate | Severe | Slight | Moderate | Moderate |
| 175--- Millsholm | Severe | Slight | Moderate | Severe | Slight | Slight | Moderate | Slight |

TABLE 7.--WOODLAND MANAGEMENT CONCERNS--Continued

| Soil name and map symbol | Seedling mortality | Plant competition | Limitation for revegetating exposed subsoil with-- | | Equipment limitation | Hazard of soil damage from-- | | Hazard of sheet when logs ar |
|---|---|---|---|---|---|---|---|---|
| | | | Grasses | Trees | | Fire | Compaction | Tractor |
| 176: | | | | | | | | |
| Millsholm | Severe | Slight | Moderate | Severe | Moderate | Slight | Moderate | Moderate |
| Azule | Severe | Moderate | Slight | Slight | Moderate | Slight | Slight | Moderate |
| 177--- Minersville | Severe | Slight | Severe | Severe | Severe | Moderate | Moderate | Severe |
| 178: | | | | | | | | |
| Minersville Variant- Choop. | Severe | Moderate | Severe | Severe | Severe | Moderate | Slight | Severe |
| 179--- Musserhill | Severe | Moderate | Slight | Slight | Moderate | Slight | Moderate | Slight |
| 180--- Musserhill | Severe | Moderate | Slight | Moderate | Severe | Slight | Moderate | Moderate |
| 181: | | | | | | | | |
| Musserhill | Severe | Moderate | Slight | Slight | Moderate | Slight | Moderate | Slight |
| Weaverville | Slight | Moderate | Slight | Slight | Slight | Slight | Moderate | Slight |
| 182: | | | | | | | | |
| Musserhill | Severe | Moderate | Slight | Moderate | Severe | Slight | Moderate | Moderate |
| Weaverville | Severe | Moderate | Slight | Slight | Moderate | Slight | Moderate | Moderate |
| 183: | | | | | | | | |
| Musserhill | Severe | Moderate | Slight | Slight | Moderate | Slight | Moderate | Slight |
| Weaverville | Slight | Moderate | Slight | Slight | Slight | Slight | Moderate | Slight |
| Urban land. | | | | | | | | |
| 184--- Musserhill Variant | Severe | Moderate | Slight | Moderate | Severe | Slight | Moderate | Severe |
| 185: | | | | | | | | |
| Pardaloe | Moderate | Moderate | Slight | Moderate | Severe | Moderate | Moderate | Severe |
| Dedrick. | | | | | | | | |
| 186: | | | | | | | | |
| Pardaloe | Severe | Moderate | Moderate | Severe | Severe | Moderate | Slight | Moderate |

TABLE 7.--WOODLAND MANAGEMENT CONCERNS--Continued

| Soil name and map symbol | Seedling mortality | Plant competition | Limitation for revegetating exposed subsoil with-- | | Equipment limitation | Hazard of soil damage from-- | | Hazard of sheet when logs ar |
|---|---|---|---|---|---|---|---|---|
| | | | Grasses | Trees | | Fire | Compaction | Tractor |
| 186: | | | | | | | | |
| Goulding---------- | Severe | Moderate | Severe | Severe | Severe | Moderate | Slight | Moderate |
| 190---------- | Severe | Slight | Severe | Severe | Severe | Severe | Slight | Severe |
| Sheetiron | | | | | | | | |
| 191: | | | | | | | | |
| Sheetiron---------- | Severe | Moderate | Moderate | Severe | Severe | Moderate | Slight | Severe |
| Barpeak---------- | Severe | Moderate | Moderate | Severe | Severe | Moderate | Slight | Severe |
| 192: | | | | | | | | |
| Sheetiron Variant--- | Moderate | Moderate | Slight | Moderate | Severe | Moderate | Moderate | Severe |
| Dedrick. | | | | | | | | |
| 195: | | | | | | | | |
| Skyrock Variant----- | Severe | Slight | Severe | Severe | Moderate | Slight | Slight | Slight |
| Rock outcrop. | | | | | | | | |
| 196: | | | | | | | | |
| Skyrock Variant----- | Severe | Slight | Severe | Severe | Severe | Moderate | Slight | Moderate |
| Rock outcrop. | | | | | | | | |
| Rubble land. | | | | | | | | |
| 198: | | | | | | | | |
| Tallowbox---------- | Severe | Moderate | Severe | Severe | Moderate | Severe | Moderate | Moderate |
| Minersville--------- | Severe | Moderate | Severe | Severe | Moderate | Moderate | Moderate | Moderate |
| 199: | | | | | | | | |
| Tallowbox---------- | Severe | Slight | Severe | Severe | Severe | Severe | Moderate | Severe |
| Minersville--------- | Severe | Slight | Severe | Severe | Severe | Moderate | Moderate | Severe |
| 202: | | | | | | | | |
| Valcreek---------- | Severe | Moderate | Severe | Severe | Severe | Moderate | Slight | Severe |
| Choop. | | | | | | | | |
| 203: | | | | | | | | |
| Valcreek---------- | Severe | Moderate | Severe | Severe | Severe | Moderate | Slight | Severe |
| Minersville--------- | Severe | Slight | Severe | Severe | Severe | Moderate | Moderate | Severe |

TABLE 7.--WOODLAND MANAGEMENT CONCERNS--Continued

| Soil name and map symbol | Seedling mortality | Plant competition | Limitation for revegetating exposed subsoil with-- | | Equipment limitation | Hazard of soil damage from-- | | Hazard of sheet when logs ar |
|---|---|---|---|---|---|---|---|---|
| | | | Grasses | Trees | | Fire | Compaction | Tractor |
| 204: | | | | | | | | |
| Valcreek---------- | Severe | Moderate | Severe | Severe | Severe | Moderate | Slight | Severe |
| Minersville--------- | Severe | Slight | Severe | Severe | Severe | Moderate | Moderate | Severe |
| Choop. | | | | | | | | |
| 205: | | | | | | | | |
| Vanvor---------- | Moderate | Moderate | Moderate | Severe | Severe | Slight | Slight | Slight |
| Hoosimbim---------- | Severe | Moderate | Severe | Severe | Moderate | Severe | Slight | Slight |
| 206: | | | | | | | | |
| Vanvor---------- | Moderate | Moderate | Moderate | Severe | Severe | Moderate | Slight | Moderate |
| Hoosimbim---------- | Severe | Moderate | Severe | Severe | Severe | Severe | Slight | Moderate |
| 208---------- Weaverville | Slight | Moderate | Slight | Slight | Moderate | Slight | Moderate | Slight |
| 209---------- Weaverville | Slight | Moderate | Slight | Slight | Severe | Slight | Moderate | Moderate |
| 210: | | | | | | | | |
| Weitchpec---------- | Severe | Moderate | Slight | Moderate | Moderate | Slight | Moderate | Severe |
| Dubakella---------- | Severe | Moderate | Severe | Severe | Moderate | Slight | Slight | Moderate |
| 211: | | | | | | | | |
| Weitchpec Variant--- | Moderate | Moderate | Slight | Slight | Moderate | Slight | Slight | Moderate |
| Bamtush Variant very gravelly loam------ | Severe | Moderate | Slight | Moderate | Moderate | Moderate | Slight | Severe |
| Bamtush Variant loam | Moderate | Moderate | Slight | Moderate | Slight | Slight | Slight | Moderate |
| 212: | | | | | | | | |
| Weitchpec Variant--- | Moderate | Moderate | Slight | Slight | Severe | Moderate | Slight | Severe |
| Bamtush Variant----- | Severe | Moderate | Slight | Moderate | Severe | Moderate | Slight | Severe |

TABLE 8.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 101--Atter | Severe: small stones. | Severe: small stones. | Severe: slope, small stones. | Severe: small stones. | Severe: small stones, droughty. |
| 102: | | | | | |
| Atter | Severe: small stones. | Severe: small stones. | Severe: small stones. | Severe: small stones. | Severe: small stones, droughty. |
| Dumps | Severe: flooding, too sandy, depth to rock. | Severe: too sandy, depth to rock. | Severe: small stones. | Slight | Severe: droughty, depth to rock. |
| Xerofluvents | Severe: flooding, too sandy, depth to rock. | Severe: too sandy, depth to rock. | Severe: small stones, flooding. | Moderate: flooding. | Severe: droughty, flooding, depth to rock. |
| 103: | | | | | |
| Bamtush | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones. | Severe: small stones, slope. |
| Brownbear | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones. | Severe: small stones, slope. |
| 104: | | | | | |
| Bamtush | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| Brownbear | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| 105: | | | | | |
| Bamtush | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| Brownbear | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| Weaverville | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 106: | | | | | |
| Bamtush | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones. | Severe: small stones, slope. |
| Weaverville | Severe: slope. | Severe: slope. | Severe: slope. | Moderate: slope, dusty. | Severe: slope. |

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 107: | | | | | |
| Bamtush | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| Weaverville | Severe: slope. | Severe: slope. | Severe: slope. | Moderate: slope, dusty. | Severe: slope. |
| Brownbear | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| 109: | | | | | |
| Barpeak | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| Sheetiron | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope. | Severe: small stones, slope. |
| 110: | | | | | |
| Beargulch | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope. | Severe: small stones, droughty, slope. |
| Skyrock | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, slope, depth to rock. |
| 111: | | | | | |
| Brockgulch | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| Dedrick | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| Brownbear | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| 112: | | | | | |
| Brownbear | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| Bamtush | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| 113, 114--Brownscreek | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 115: | | | | | |
| Brownscreek | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Dedrick | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| 116, 117: | | | | | |
| Brownscreek | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Dougcity | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| 118, 119: | | | | | |
| Cargent | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope. | Severe: small stones, slope. |
| Demogul | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| 120, 121 Caris | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| 122: | | | | | |
| Caris | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| Indleton | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| Hoosimbim | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| 123, 124 Carrcreek | Moderate: small stones. | Moderate: small stones. | Severe: small stones. | Slight | Moderate: small stones, droughty. |
| 125 Choop | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope. | Severe: droughty, slope, depth to rock. |

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 126: | | | | | |
| Choop | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope. | Severe: droughty, slope, depth to rock. |
| Rock outcrop. | | | | | |
| 127--- Crefork | Moderate: percs slowly, dusty. | Moderate: percs slowly, dusty. | Moderate: slope, small stones, percs slowly. | Moderate: dusty. | Slight. |
| 128--- Crefork | Moderate: slope, percs slowly, dusty. | Moderate: slope, percs slowly, dusty. | Severe: slope. | Moderate: dusty. | Moderate: slope. |
| 129--- Crefork | Severe: slope. | Severe: slope. | Severe: slope. | Moderate: slope. | Severe: slope. |
| 131: | | | | | |
| Crefork | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Musserhill | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| 132--- Dedrick | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| 133: | | | | | |
| Dedrick | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| Rock outcrop. | | | | | |
| 134--- Demogul | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| 136: | | | | | |
| Dougcity | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Dedrick | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| 137: | | | | | |
| Dougcity | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 137: | | | | | |
| Demogul | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| 138 | Severe: slope. | Severe: slope. | Severe: large stones, slope, small stones. | Moderate: large stones. | Severe: slope. |
| 139, 140 | Severe: slope. | Severe: slope. | Severe: large stones, slope, small stones. | Severe: slope. | Severe: slope. |
| 141 | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| 142 | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| 143: | | | | | |
| Etsel | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| Bamtush | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| 144: | | | | | |
| Etsel | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| Weitchpec | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| 145: | | | | | |
| Goulding | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, slope, depth to rock. |
| Holkat Variant | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Marpa Variant | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 146: | | | | | |
| Goulding | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, slope, depth to rock. |
| Vitzthum | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| Vanvor | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| 147, 148 Haploxerolls | Moderate: small stones. | Moderate: small stones. | Severe: small stones. | Slight | Moderate: small stones, large stones, droughty. |
| 149 Haysum | Slight | Slight | Severe: slope. | Severe: erodes easily. | Slight. |
| 150, 151 Haysum | Moderate: small stones. | Moderate: small stones. | Severe: small stones. | Slight | Moderate: small stones. |
| 152 Haysum | Moderate: small stones. | Moderate: small stones. | Severe: slope, small stones. | Slight | Moderate: small stones. |
| 153, 154: | | | | | |
| Holkat | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Hoosimbim | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| 155: | | | | | |
| Holkat Variant | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Dedrick | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| 156 Hoosimbim | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| 157: | | | | | |
| Hoosimbim | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| Bamtush | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 157: | | | | | |
| Marpa | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. |
| 158: | | | | | |
| Hoosimbim | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| Etsel | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| 159: | | | | | |
| Hoosimbim | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| Goulding | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, slope, depth to rock. |
| 160 Hotaw | Severe: slope. | Severe: slope. | Severe: slope. | Moderate: slope, dusty. | Severe: slope. |
| 161 Hotaw | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 162: | | | | | |
| Indleton | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| Caris | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| Hoosimbim | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| 163 Jafa | Moderate: dusty. | Moderate: dusty. | Moderate: slope, small stones, dusty. | Slight | Slight. |
| 164 Jafa | Moderate: slope, dusty. | Moderate: slope, dusty. | Severe: slope. | Slight | Moderate: slope. |
| 165, 166 Jafa | Moderate: small stones, dusty. | Moderate: small stones, dusty. | Severe: small stones. | Moderate: dusty. | Moderate: small stones, droughty. |
| 167 Jafa | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Moderate: slope, dusty. | Severe: slope. |

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 170: | | | | | |
| Marpa | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. |
| Hoosimbim | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| 171: | | | | | |
| Marpa | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. |
| Hoosimbim | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| Bamtush | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| 172: | | | | | |
| Marpa | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. |
| Vitzthum | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| 173: | | | | | |
| Marpa Variant | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Goulding | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, slope, depth to rock. |
| Holkat Variant | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 175--- Millsholm | Severe: depth to rock. | Severe: depth to rock. | Severe: slope, depth to rock. | Severe: erodes easily. | Severe: thin layer. |
| 176: | | | | | |
| Millsholm | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: erodes easily. | Severe: slope, thin layer. |
| Azule | Severe: slope. | Severe: slope. | Severe: slope. | Moderate: slope. | Severe: slope. |
| 177--- Minersville | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 178: Minersville Variant-- | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: droughty, slope. |
| Choop | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope. | Severe: droughty, slope, depth to rock. |
| 179-- Musserhill | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Moderate: slope. | Severe: slope. |
| 180-- Musserhill | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| 181: Musserhill | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Moderate: slope. | Severe: slope. |
| Weaverville | Severe: slope. | Severe: slope. | Severe: slope. | Moderate: slope, dusty. | Severe: slope. |
| 182: Musserhill | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Weaverville | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 183: Musserhill | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Moderate: slope. | Severe: slope. |
| Weaverville | Severe: slope. | Severe: slope. | Severe: slope. | Moderate: slope, dusty. | Severe: slope. |
| Urban land. | | | | | |
| 184-- Musserhill Variant | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 185: Pardaloe | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Dedrick | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| 186: Pardaloe | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope. | Severe: small stones, slope. |

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 186: Goulding | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, slope, depth to rock. |
| 188--Rock outcrop | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Slight | Severe: depth to rock. |
| 189: Rock outcrop | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope. | Severe: depth to rock. |
| Dedrick | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| 190--Sheetiron | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| 191: Sheetiron | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope. | Severe: small stones, slope. |
| Barpeak | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| 192: Sheetiron Variant | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Dedrick | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| 193--Skyrock | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, slope, depth to rock. |
| 194: Skyrock | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, slope, depth to rock. |
| Rock outcrop. | | | | | |
| 195: Skyrock Variant | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: large stones, slope, small stones. | Severe: slope. | Severe: slope, depth to rock. |

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 195: | | | | | |
| Rock outcrop | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope. | Severe: depth to rock. |
| 196: | | | | | |
| Skyrock Variant | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: large stones, slope, small stones. | Severe: slope. | Severe: slope, depth to rock. |
| Rock outcrop. | | | | | |
| Rubble land. | | | | | |
| 197: | | | | | |
| Springgulch | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Brockgulch Variant | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 198, 199: | | | | | |
| Tallowbox | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Minersville | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 201: | | | | | |
| Urban land. | | | | | |
| Xeralfs | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Moderate: slope. | Severe: small stones, slope, depth to rock. |
| 202: | | | | | |
| Valcreek | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope. | Severe: small stones, droughty, slope. |
| Choop | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope. | Severe: droughty, slope, depth to rock. |
| 203: | | | | | |
| Valcreek | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope. | Severe: small stones, droughty, slope. |
| Minersville | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 204: | | | | | |
| Valcreek | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope. | Severe: small stones, droughty, slope. |
| Minersville | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Choop | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope. | Severe: droughty, slope, depth to rock. |
| 205, 206: | | | | | |
| Vanvor | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| Hoosimbim | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: small stones, slope. |
| 207: | | | | | |
| Vitzthum | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones. | Severe: small stones, droughty, slope. |
| Cargent | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope. | Severe: small stones, slope. |
| 208 Weaverville | Severe: slope. | Severe: slope. | Severe: slope. | Moderate: slope, dusty. | Severe: slope. |
| 209 Weaverville | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 210: | | | | | |
| Weitchpec | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Dubakella | Severe: slope. | Severe: slope. | Severe: large stones, slope, small stones. | Severe: slope. | Severe: slope. |
| 211: | | | | | |
| Weitchpec Variant | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Bamtush Variant very gravelly loam | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope. | Severe: small stones, slope. |

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 211: | | | | | |
| Bamtush Variant loam- | Severe: slope. | Severe: slope. | Severe: slope. | Moderate: slope, dusty. | Severe: slope. |
| 212: | | | | | |
| Weitchpec Variant---- | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Bamtush Variant------ | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope. | Severe: small stones, slope. |
| 213: | | | | | |
| Xeralfs---------- | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope. | Severe: small stones, slope, depth to rock. |
| Xerorthents---------- | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope. | Severe: small stones, slope, depth to rock. |
| 215---------- Xererts | Severe: percs slowly. | Severe: percs slowly. | Severe: large stones, slope, percs slowly. | Moderate: large stones. | Moderate: large stones, slope. |
| 216: | | | | | |
| Xererts---------- | Severe: percs slowly. | Severe: percs slowly. | Severe: large stones, percs slowly. | Moderate: large stones. | Moderate: large stones. |
| Haysum---------- | Slight---------- | Slight---------- | Moderate: slope, small stones. | Severe: erodes easily. | Slight. |
| 217: | | | | | |
| Xerofluvents--------- | Severe: flooding, too sandy, depth to rock. | Severe: too sandy, depth to rock. | Severe: small stones, flooding. | Moderate: flooding. | Severe: droughty, flooding, depth to rock. |
| Riverwash---------- | Severe: flooding, wetness, too sandy. | Severe: wetness, too sandy. | Severe: small stones, too sandy. | Severe: wetness, too sandy. | Severe: wetness, droughty, flooding. |
| 218: | | | | | |
| Xerorthents---------- | Severe: small stones, depth to rock. | Severe: small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Slight---------- | Severe: small stones, depth to rock. |
| Rock outcrop--------- | Severe: depth to rock. | Severe: depth to rock. | Severe: slope, depth to rock. | Slight---------- | Severe: depth to rock. |

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 219: | | | | | |
| Xerorthents---------- | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope. | Severe: small stones, slope, depth to rock. |
| Rock outcrop--------- | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope. | Severe: depth to rock. |

TABLE 9.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 101--- Atter | Severe: cutbanks cave. | Moderate: slope, large stones. | Moderate: slope, large stones. | Severe: slope. | Moderate: slope, large stones. | Severe: small stones, droughty. |
| 102: | | | | | | |
| Atter--- | Severe: cutbanks cave. | Moderate: large stones. | Moderate: large stones. | Moderate: slope, large stones. | Moderate: large stones. | Severe: small stones, droughty. |
| Dumps--- | Severe: depth to rock, cutbanks cave. | Severe: flooding, depth to rock. | Severe: flooding, depth to rock. | Severe: flooding, depth to rock. | Severe: depth to rock, flooding. | Severe: droughty, depth to rock. |
| Xerofluvents--- | Severe: depth to rock, cutbanks cave. | Severe: flooding, depth to rock. | Severe: flooding, depth to rock. | Severe: flooding, depth to rock. | Severe: depth to rock, flooding. | Severe: droughty, flooding, depth to rock. |
| 103, 104: | | | | | | |
| Bamtush--- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Brownbear--- | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 105: | | | | | | |
| Bamtush--- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Brownbear--- | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Weaverville--- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 106: | | | | | | |
| Bamtush--- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Weaverville--- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 107: | | | | | | |
| Bamtush--- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Weaverville--- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 107: | | | | | | |
| Brownbear | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 109: | | | | | | |
| Barpeak | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, droughty, slope. |
| Sheetiron | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 110: | | | | | | |
| Beargulch | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, droughty, slope. |
| Skyrock | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, slope, depth to rock. |
| 111: | | | | | | |
| Brockgulch | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Dedrick | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| Brownbear | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 112: | | | | | | |
| Brownbear | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Bamtush | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 113, 114--- Brownscreek | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 115: | | | | | | |
| Brownscreek | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 115: Dedrick | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| 116, 117: Brownscreek | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Dougcity | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 118, 119: Cargent | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Demogul | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 120, 121--- Caris | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, droughty, slope. |
| 122: Caris | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, droughty, slope. |
| Indleton | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, droughty, slope. |
| Hoosimbim | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 123, 124--- Carrcreek | Slight | Slight | Slight | Slight | Slight | Moderate: small stones, droughty. |
| 125--- Choop | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: droughty, slope, depth to rock. |
| 126: Choop | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: droughty, slope, depth to rock. |
| Rock outcrop. | | | | | | |

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 127---------- Crefork | Moderate: too clayey. | Severe: shrink-swell. | Severe: shrink-swell. | Severe: shrink-swell. | Severe: shrink-swell, low strength. | Slight. |
| 128---------- Crefork | Moderate: too clayey, slope. | Severe: shrink-swell. | Severe: shrink-swell. | Severe: shrink-swell, slope. | Severe: shrink-swell, low strength. | Moderate: slope. |
| 129---------- Crefork | Severe: slope. | Severe: shrink-swell, slope. | Severe: slope, shrink-swell. | Severe: shrink-swell, slope. | Severe: shrink-swell, low strength, slope. | Severe: slope. |
| 131: Crefork---------- | Severe: slope. | Severe: shrink-swell, slope. | Severe: slope, shrink-swell. | Severe: shrink-swell, slope. | Severe: shrink-swell, low strength, slope. | Severe: slope. |
| Musserhill------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 132---------- Dedrick | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| 133: Dedrick---------- | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| Rock outcrop. | | | | | | |
| 134---------- Demogul | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 136: Dougcity--------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Dedrick---------- | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| 137: Dougcity--------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Demogul---------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 138, 139, 140, 141---------- Dubakella | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 142---------- Etsel | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| 143: | | | | | | |
| Etsel---------- | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| Bamtush---------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 144: | | | | | | |
| Etsel---------- | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| Weitchpec-------- | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 145: | | | | | | |
| Goulding--------- | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, slope, depth to rock. |
| Holkat Variant--- | Severe: slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Marpa Variant---- | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 146: | | | | | | |
| Goulding--------- | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, slope, depth to rock. |
| Vitzthum--------- | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| Vanvor---------- | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 147---------- Haploxerolls | Severe: cutbanks cave. | Slight--------- | Slight--------- | Slight--------- | Slight--------- | Moderate: small stones, large stones, droughty. |

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 148---------- Haploxerolls | Severe: cutbanks cave. | Slight--------- | Slight--------- | Moderate: slope. | Slight--------- | Moderate: small stones, large stones, droughty. |
| 149---------- Haysum | Slight--------- | Slight--------- | Slight--------- | Moderate: slope. | Slight--------- | Slight. |
| 150, 151---------- Haysum | Slight--------- | Slight--------- | Slight--------- | Slight--------- | Slight--------- | Moderate: small stones. |
| 152---------- Haysum | Slight--------- | Slight--------- | Slight--------- | Moderate: slope. | Slight--------- | Moderate: small stones. |
| 153, 154: | | | | | | |
| Holkat---------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Hoosimbim-------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 155: | | | | | | |
| Holkat Variant--- | Severe: slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Dedrick---------- | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| 156---------- Hoosimbim | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 157: | | | | | | |
| Hoosimbim-------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Bamtush---------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Marpa---------- | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 158: | | | | | | |
| Hoosimbim-------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Etsel---------- | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| 159: | | | | | | |
| Hoosimbim-------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 159: | | | | | | |
| Goulding | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, slope, depth to rock. |
| 160, 161<br>Hotaw | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 162: | | | | | | |
| Indleton | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, droughty, slope. |
| Caris | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, droughty, slope. |
| Hoosimbim | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 163<br>Jafa | Slight | Moderate: shrink-swell. | Moderate: shrink-swell. | Moderate: shrink-swell. | Moderate: shrink-swell. | Slight. |
| 164<br>Jafa | Moderate: slope. | Moderate: shrink-swell, slope. | Moderate: slope, shrink-swell. | Severe: slope. | Moderate: shrink-swell, slope. | Moderate: slope. |
| 165<br>Jafa | Slight | Slight | Slight | Slight | Moderate: frost action. | Moderate: small stones, droughty. |
| 166<br>Jafa | Slight | Slight | Slight | Moderate: slope. | Moderate: frost action. | Moderate: small stones, droughty. |
| 167<br>Jafa | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 170: | | | | | | |
| Marpa | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Hoosimbim | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 171: | | | | | | |
| Marpa | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Hoosimbim | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Bamtush | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 172: | | | | | | |
| Marpa | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Vitzthum | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| 173: | | | | | | |
| Marpa Variant | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Goulding | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, slope, depth to rock. |
| Holkat Variant | Severe: slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 175--- Millsholm | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: thin layer. |
| 176: | | | | | | |
| Millsholm | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, thin layer. |
| Azule | Severe: slope. | Severe: shrink-swell, slope. | Severe: slope, shrink-swell. | Severe: shrink-swell, slope. | Severe: shrink-swell, low strength, slope. | Severe: slope. |
| 177--- Minersville | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 178: | | | | | | |
| Minersville Variant | Severe: cutbanks cave, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: droughty, slope. |
| Choop | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: droughty, slope, depth to rock. |
| 179, 180--- Musserhill | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 181, 182: | | | | | | |
| Musserhill | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Weaverville | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 183: | | | | | | |
| Musserhill | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Weaverville | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Urban land. | | | | | | |
| 184--- Musserhill Variant | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 185: | | | | | | |
| Pardaloe | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Dedrick | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| 186: | | | | | | |
| Pardaloe | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Goulding | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, slope, depth to rock. |
| 188--- Rock outcrop | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. |
| 189: | | | | | | |
| Rock outcrop | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: depth to rock. |
| Dedrick | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| 190--- Sheetiron | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 191: | | | | | | |
| Sheetiron | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Barpeak | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, droughty, slope. |

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 192: | | | | | | |
| Sheetiron Variant | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Dedrick---------- | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| 193---------- Skyrock | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, slope, depth to rock. |
| 194: | | | | | | |
| Skyrock---------- | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, slope, depth to rock. |
| Rock outcrop. | | | | | | |
| 195: | | | | | | |
| Skyrock Variant-- | Severe: depth to rock, large stones, slope. | Severe: slope, depth to rock, large stones. | Severe: depth to rock, slope, large stones. | Severe: slope, depth to rock, large stones. | Severe: depth to rock, slope, large stones. | Severe: slope, depth to rock. |
| Rock outcrop----- | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: depth to rock. |
| 196: | | | | | | |
| Skyrock Variant-- | Severe: depth to rock, large stones, slope. | Severe: slope, depth to rock, large stones. | Severe: depth to rock, slope, large stones. | Severe: slope, depth to rock, large stones. | Severe: depth to rock, slope, large stones. | Severe: slope, depth to rock. |
| Rock outcrop. | | | | | | |
| Rubble land. | | | | | | |
| 197: | | | | | | |
| Springgulch------ | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Brockgulch Variant--------- | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 198, 199: | | | | | | |
| Tallowbox-------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Minersville------ | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 201: | | | | | | |
| Urban land. | | | | | | |

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 201: | | | | | | |
| Xeralfs | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope, depth to rock. |
| 202: | | | | | | |
| Valcreek | Severe: cutbanks cave, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, droughty, slope. |
| Choop | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: droughty, slope, depth to rock. |
| 203: | | | | | | |
| Valcreek | Severe: cutbanks cave, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, droughty, slope. |
| Minersville | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 204: | | | | | | |
| Valcreek | Severe: cutbanks cave, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, droughty, slope. |
| Minersville | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Choop | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: droughty, slope, depth to rock. |
| 205, 206: | | | | | | |
| Vanvor | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Hoosimbim | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 207: | | | | | | |
| Vitzthum | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, droughty, slope. |
| Cargent | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 208, 209 Weaverville | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 210: | | | | | | |
| Weitchpec | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Dubakella | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 211: | | | | | | |
| Weitchpec Variant | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Bamtush Variant very gravelly loam | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| Bamtush Variant loam | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 212: | | | | | | |
| Weitchpec Variant | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Bamtush Variant-- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope. |
| 213: | | | | | | |
| Xeralfs | Severe: depth to rock, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Severe: slope. | Severe: small stones, slope, depth to rock. |
| Xerorthents | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, slope, depth to rock. |
| 215--- Xererts | Moderate: too clayey, slope. | Severe: shrink-swell. | Severe: shrink-swell. | Severe: shrink-swell, slope. | Severe: shrink-swell, low strength. | Moderate: large stones, slope. |
| 216: | | | | | | |
| Xererts | Moderate: too clayey. | Severe: shrink-swell. | Severe: shrink-swell. | Severe: shrink-swell. | Severe: shrink-swell, low strength. | Moderate: large stones. |
| Haysum | Slight | Slight | Slight | Slight | Slight | Slight. |
| 217: | | | | | | |
| Xerofluvents | Severe: depth to rock, cutbanks cave. | Severe: flooding, depth to rock. | Severe: flooding, depth to rock. | Severe: flooding, depth to rock. | Severe: depth to rock, flooding. | Severe: droughty, flooding, depth to rock. |
| Riverwash | Severe: cutbanks cave, wetness. | Severe: flooding, wetness. | Severe: flooding, wetness. | Severe: flooding, wetness. | Severe: wetness, flooding. | Severe: wetness, droughty, flooding. |

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 218: | | | | | | |
| Xerorthents------ | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: slope, depth to rock. | Severe: depth to rock. | Severe: small stones, depth to rock. |
| Rock outcrop----- | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: slope, depth to rock. | Severe: depth to rock. | Severe: depth to rock. |
| 219: | | | | | | |
| Xerorthents------ | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: small stones, slope, depth to rock. |
| Rock outcrop----- | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: slope, depth to rock. | Severe: depth to rock, slope. | Severe: depth to rock. |

TABLE 10.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "poor," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 101----------<br>Atter | Severe:<br>poor filter. | Severe:<br>seepage,<br>slope. | Severe:<br>seepage,<br>too sandy. | Severe:<br>seepage. | Poor:<br>seepage,<br>too sandy,<br>large stones. |
| 102:<br>Atter---------- | Severe:<br>poor filter. | Severe:<br>seepage. | Severe:<br>seepage,<br>too sandy. | Severe:<br>seepage. | Poor:<br>seepage,<br>too sandy,<br>large stones. |
| Dumps---------- | Severe:<br>flooding,<br>depth to rock,<br>poor filter. | Severe:<br>seepage,<br>depth to rock,<br>flooding. | Severe:<br>flooding,<br>depth to rock,<br>seepage. | Severe:<br>flooding,<br>depth to rock,<br>seepage. | Poor:<br>depth to rock,<br>too sandy,<br>small stones. |
| Xerofluvents------- | Severe:<br>flooding,<br>depth to rock,<br>poor filter. | Severe:<br>seepage,<br>depth to rock,<br>flooding. | Severe:<br>flooding,<br>depth to rock,<br>seepage. | Severe:<br>flooding,<br>depth to rock,<br>seepage. | Poor:<br>depth to rock,<br>too sandy,<br>small stones. |
| 103, 104:<br>Bamtush---------- | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Poor:<br>small stones,<br>slope. |
| Brownbear---------- | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Poor:<br>depth to rock,<br>small stones,<br>slope. |
| 105:<br>Bamtush---------- | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Poor:<br>small stones,<br>slope. |
| Brownbear---------- | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Poor:<br>depth to rock,<br>small stones,<br>slope. |
| Weaverville-------- | Severe:<br>percs slowly,<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Poor:<br>hard to pack,<br>slope. |
| 106:<br>Bamtush---------- | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Poor:<br>small stones,<br>slope. |
| Weaverville-------- | Severe:<br>percs slowly,<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Poor:<br>hard to pack,<br>slope. |

TABLE 10.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 107: | | | | | |
| Bamtush | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: small stones, slope. |
| Weaverville | Severe: percs slowly, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: hard to pack, slope. |
| Brownbear | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 109: | | | | | |
| Barpeak | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: seepage, small stones, slope. |
| Sheetiron | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 110: | | | | | |
| Beargulch | Severe: slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| Skyrock | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 111: | | | | | |
| Brockgulch | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Dedrick | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Brownbear | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 112: | | | | | |
| Brownbear | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Bamtush | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: small stones, slope. |

TABLE 10.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 113, 114---------- Brownscreek | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 115: | | | | | |
| Brownscreek-------- | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Dedrick---------- | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 116, 117: | | | | | |
| Brownscreek-------- | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Dougcity---------- | Severe: percs slowly, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| 118, 119: | | | | | |
| Cargent---------- | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Demogul---------- | Severe: percs slowly, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: small stones, slope. |
| 120, 121---------- Caris | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 122: | | | | | |
| Caris---------- | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Indleton---------- | Severe: slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| Hoosimbim---------- | Severe: slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| 123---------- Carrcreek | Moderate: percs slowly. | Moderate: seepage. | Moderate: too clayey. | Slight---------- | Poor: small stones. |
| 124---------- Carrcreek | Moderate: percs slowly. | Moderate: seepage, slope. | Moderate: too clayey. | Slight---------- | Poor: small stones. |

TABLE 10.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 125----------<br>Choop | Severe:<br>depth to rock,<br>slope. | Severe:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>seepage,<br>slope. | Severe:<br>depth to rock,<br>slope. | Poor:<br>depth to rock,<br>seepage,<br>small stones. |
| 126:<br>Choop---------- | Severe:<br>depth to rock,<br>slope. | Severe:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>seepage,<br>slope. | Severe:<br>depth to rock,<br>slope. | Poor:<br>depth to rock,<br>seepage,<br>small stones. |
| Rock outcrop. | | | | | |
| 127----------<br>Crefork | Severe:<br>percs slowly. | Moderate:<br>slope. | Severe:<br>too clayey. | Slight---------- | Poor:<br>too clayey,<br>hard to pack. |
| 128----------<br>Crefork | Severe:<br>percs slowly. | Severe:<br>slope. | Severe:<br>too clayey. | Moderate:<br>slope. | Poor:<br>too clayey,<br>hard to pack. |
| 129----------<br>Crefork | Severe:<br>percs slowly,<br>slope. | Severe:<br>slope. | Severe:<br>slope,<br>too clayey. | Severe:<br>slope. | Poor:<br>too clayey,<br>hard to pack,<br>slope. |
| 131:<br>Crefork---------- | Severe:<br>percs slowly,<br>slope. | Severe:<br>slope. | Severe:<br>slope,<br>too clayey. | Severe:<br>slope. | Poor:<br>too clayey,<br>hard to pack,<br>slope. |
| Musserhill--------- | Severe:<br>depth to rock,<br>percs slowly,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Poor:<br>depth to rock,<br>small stones,<br>slope. |
| 132----------<br>Dedrick | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Poor:<br>depth to rock,<br>small stones,<br>slope. |
| 133:<br>Dedrick---------- | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Poor:<br>depth to rock,<br>small stones,<br>slope. |
| Rock outcrop. | | | | | |
| 134----------<br>Demogul | Severe:<br>percs slowly,<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Poor:<br>small stones,<br>slope. |
| 136:<br>Dougcity---------- | Severe:<br>percs slowly,<br>slope. | Severe:<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>slope. | Poor:<br>small stones,<br>slope. |

TABLE 10.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 136: | | | | | |
| Dedrick | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 137: | | | | | |
| Dougcity | Severe: percs slowly, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| Demogul | Severe: percs slowly, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: small stones, slope. |
| 138, 139, 140--- Dubakella | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 141--- Dubakella | Severe: depth to rock, percs slowly, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 142--- Etsel | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 143: | | | | | |
| Etsel | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Bamtush | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: small stones, slope. |
| 144: | | | | | |
| Etsel | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Weitchpec | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 145: | | | | | |
| Goulding | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Holkat Variant | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |

TABLE 10.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 145: | | | | | |
| Marpa Variant | Severe: depth to rock, percs slowly, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope, too clayey. | Severe: depth to rock, slope. | Poor: depth to rock, too clayey, small stones. |
| 146: | | | | | |
| Goulding | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Vitzthum | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Vanvor | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 147, 148 Haploxerolls | Severe: poor filter. | Severe: seepage. | Severe: seepage. | Severe: seepage. | Poor: small stones. |
| 149 Haysum | Moderate: percs slowly. | Severe: slope. | Moderate: too clayey. | Slight | Poor: small stones. |
| 150 Haysum | Moderate: percs slowly. | Moderate: seepage. | Moderate: too clayey. | Slight | Poor: small stones. |
| 151 Haysum | Moderate: percs slowly. | Moderate: seepage, slope. | Moderate: too clayey. | Slight | Poor: small stones. |
| 152 Haysum | Moderate: percs slowly. | Severe: slope. | Moderate: too clayey. | Slight | Poor: small stones. |
| 153, 154: | | | | | |
| Holkat | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, slope. |
| Hoosimbim | Severe: slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| 155: | | | | | |
| Holkat Variant | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Dedrick | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 156 Hoosimbim | Severe: percs slowly, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |

TABLE 10.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 157: | | | | | |
| Hoosimbim | Severe: slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| Bamtush | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: small stones, slope. |
| Marpa | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, small stones, slope. |
| 158: | | | | | |
| Hoosimbim | Severe: slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| Etsel | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 159: | | | | | |
| Hoosimbim | Severe: slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| Goulding | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 160, 161 Hotaw | Severe: depth to rock, percs slowly, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, slope. |
| 162: | | | | | |
| Indleton | Severe: slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| Caris | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Hoosimbim | Severe: slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| 163 Jafa | Severe: percs slowly. | Moderate: seepage, slope. | Moderate: too clayey. | Slight | Poor: small stones. |
| 164 Jafa | Severe: percs slowly. | Severe: slope. | Moderate: slope, too clayey. | Moderate: slope. | Poor: small stones. |
| 165 Jafa | Severe: percs slowly. | Moderate: seepage. | Moderate: too clayey. | Slight | Poor: small stones. |

TABLE 10.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 166----------<br>Jafa | Severe:<br>percs slowly. | Moderate:<br>seepage,<br>slope. | Moderate:<br>too clayey. | Slight---------- | Poor:<br>small stones. |
| 167----------<br>Jafa | Severe:<br>percs slowly,<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Poor:<br>small stones,<br>slope. |
| 170:<br>Marpa---------- | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>small stones,<br>slope. |
| Hoosimbim---------- | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>slope. | Poor:<br>small stones,<br>slope. |
| 171:<br>Marpa---------- | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>small stones,<br>slope. |
| Hoosimbim---------- | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>slope. | Poor:<br>small stones,<br>slope. |
| Bamtush---------- | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Severe:<br>slope. | Poor:<br>small stones,<br>slope. |
| 172:<br>Marpa---------- | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>small stones,<br>slope. |
| Vitzthum---------- | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Poor:<br>depth to rock,<br>small stones,<br>slope. |
| 173:<br>Marpa Variant------ | Severe:<br>depth to rock,<br>percs slowly,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope,<br>too clayey. | Severe:<br>depth to rock,<br>slope. | Poor:<br>depth to rock,<br>too clayey,<br>small stones. |
| Goulding---------- | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Poor:<br>depth to rock,<br>small stones,<br>slope. |
| Holkat Variant----- | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>slope. | Poor:<br>depth to rock,<br>small stones,<br>slope. |
| 175----------<br>Millsholm | Severe:<br>depth to rock. | Severe:<br>depth to rock,<br>slope. | Severe:<br>depth to rock. | Severe:<br>depth to rock. | Poor:<br>area reclaim. |

TABLE 10.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 176: | | | | | |
| Millsholm | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: area reclaim, slope. |
| Azule | Severe: depth to rock, percs slowly, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope, too clayey. | Severe: depth to rock, slope. | Poor: depth to rock, too clayey, hard to pack. |
| 177--- Minersville | Severe: slope. | Severe: seepage, slope. | Severe: depth to rock, seepage, slope. | Severe: seepage, slope. | Poor: slope. |
| 178: | | | | | |
| Minersville Variant | Severe: depth to rock, poor filter, slope. | Severe: seepage, depth to rock, slope. | Severe: depth to rock, seepage, slope. | Severe: depth to rock, seepage, slope. | Poor: depth to rock, seepage, small stones. |
| Choop | Severe: depth to rock, slope. | Severe: seepage, depth to rock, slope. | Severe: depth to rock, seepage, slope. | Severe: depth to rock, slope. | Poor: depth to rock, seepage, small stones. |
| 179, 180--- Musserhill | Severe: depth to rock, percs slowly, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 181, 182: | | | | | |
| Musserhill | Severe: depth to rock, percs slowly, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Weaverville | Severe: percs slowly, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: hard to pack, slope. |
| 183: | | | | | |
| Musserhill | Severe: depth to rock, percs slowly, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Weaverville | Severe: percs slowly, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: hard to pack, slope. |
| Urban land. | | | | | |
| 184--- Musserhill Variant | Severe: depth to rock, percs slowly, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope, too clayey. | Severe: depth to rock, slope. | Poor: depth to rock, too clayey, small stones. |
| 185: | | | | | |
| Pardaloe | Severe: slope. | Severe: seepage, slope. | Severe: slope. | Severe: slope. | Poor: seepage, small stones, slope. |

TABLE 10.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 185: | | | | | |
| Dedrick | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 186: | | | | | |
| Pardaloe | Severe: slope. | Severe: seepage, slope. | Severe: slope. | Severe: slope. | Poor: seepage, small stones, slope. |
| Goulding | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 188 Rock outcrop | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Poor: depth to rock. |
| 189: | | | | | |
| Rock outcrop | Severe: depth to rock. | Severe: depth to rock, slope. | Severe: depth to rock. | Severe: depth to rock. | Poor: depth to rock, slope. |
| Dedrick | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 190 Sheetiron | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 191: | | | | | |
| Sheetiron | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Barpeak | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: seepage, small stones, slope. |
| 192: | | | | | |
| Sheetiron Variant | Severe: depth to rock, percs slowly, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Dedrick | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 193 Skyrock | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |

TABLE 10.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 194: | | | | | |
| Skyrock | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Rock outcrop. | | | | | |
| 195: | | | | | |
| Skyrock Variant | Severe: depth to rock, slope, large stones. | Severe: depth to rock, slope, large stones. | Severe: depth to rock, slope, large stones. | Severe: depth to rock, slope. | Poor: depth to rock, large stones, slope. |
| Rock outcrop | Severe: depth to rock. | Severe: depth to rock, slope. | Severe: depth to rock. | Severe: depth to rock. | Poor: depth to rock, slope. |
| 196: | | | | | |
| Skyrock Variant | Severe: depth to rock, slope, large stones. | Severe: depth to rock, slope, large stones. | Severe: depth to rock, slope, large stones. | Severe: depth to rock, slope. | Poor: depth to rock, large stones, slope. |
| Rock outcrop. | | | | | |
| Rubble land. | | | | | |
| 197: | | | | | |
| Springgulch | Severe: percs slowly, slope. | Severe: slope. | Severe: slope, too clayey. | Severe: slope. | Poor: too clayey, hard to pack, slope. |
| Brockgulch Variant- | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 198, 199: | | | | | |
| Tallowbox | Severe: depth to rock, slope. | Severe: seepage, depth to rock, slope. | Severe: depth to rock, seepage, slope. | Severe: depth to rock, seepage, slope. | Poor: depth to rock, small stones, slope. |
| Minersville | Severe: slope. | Severe: seepage, slope. | Severe: depth to rock, seepage, slope. | Severe: seepage, slope. | Poor: slope. |
| 201: | | | | | |
| Urban land. | | | | | |
| Xeralfs | Severe: depth to rock, percs slowly, slope. | Severe: seepage, depth to rock, slope. | Severe: depth to rock, seepage, slope. | Severe: depth to rock, seepage, slope. | Poor: depth to rock, small stones, slope. |

TABLE 10.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 202: | | | | | |
| Valcreek | Severe: depth to rock, poor filter, slope. | Severe: seepage, depth to rock, slope. | Severe: depth to rock, seepage, slope. | Severe: depth to rock, seepage, slope. | Poor: depth to rock, seepage, small stones. |
| Choop | Severe: depth to rock, slope. | Severe: seepage, depth to rock, slope. | Severe: depth to rock, seepage, slope. | Severe: depth to rock, slope. | Poor: depth to rock, seepage, small stones. |
| 203: | | | | | |
| Valcreek | Severe: depth to rock, poor filter, slope. | Severe: seepage, depth to rock, slope. | Severe: depth to rock, seepage, slope. | Severe: depth to rock, seepage, slope. | Poor: depth to rock, seepage, small stones. |
| Minersville | Severe: slope. | Severe: seepage, slope. | Severe: depth to rock, seepage, slope. | Severe: seepage, slope. | Poor: slope. |
| 204: | | | | | |
| Valcreek | Severe: depth to rock, poor filter, slope. | Severe: seepage, depth to rock, slope. | Severe: depth to rock, seepage, slope. | Severe: depth to rock, seepage, slope. | Poor: depth to rock, seepage, small stones. |
| Minersville | Severe: slope. | Severe: seepage, slope. | Severe: depth to rock, seepage, slope. | Severe: seepage, slope. | Poor: slope. |
| Choop | Severe: depth to rock, slope. | Severe: seepage, depth to rock, slope. | Severe: depth to rock, seepage, slope. | Severe: depth to rock, slope. | Poor: depth to rock, seepage, small stones. |
| 205, 206: | | | | | |
| Vanvor | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Hoosimbim | Severe: slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| 207: | | | | | |
| Vitzthum | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Cargent | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |

TABLE 10.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 208, 209---------- Weaverville | Severe: percs slowly, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: hard to pack, slope. |
| 210: Weitchpec---------- | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Dubakella---------- | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 211: Weitchpec Variant-- | Severe: percs slowly, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| Bamtush Variant very gravelly loam | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: small stones, slope. |
| Bamtush Variant loam---------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: small stones, slope. |
| 212: Weitchpec Variant-- | Severe: percs slowly, slope. | Severe: slope. | Severe: depth to rock, slope. | Severe: slope. | Poor: small stones, slope. |
| Bamtush Variant---- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: small stones, slope. |
| 213: Xeralfs---------- | Severe: depth to rock, percs slowly, slope. | Severe: seepage, depth to rock, slope. | Severe: depth to rock, seepage, slope. | Severe: depth to rock, seepage, slope. | Poor: depth to rock, small stones, slope. |
| Xerorthents-------- | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| 215---------- Xererts | Severe: percs slowly. | Severe: slope. | Severe: depth to rock, too clayey. | Moderate: depth to rock, slope. | Poor: too clayey, hard to pack. |
| 216: Xererts---------- | Severe: percs slowly. | Moderate: depth to rock, slope. | Severe: depth to rock, too clayey. | Moderate: depth to rock. | Poor: too clayey, hard to pack. |
| Haysum---------- | Moderate: percs slowly. | Moderate: seepage, slope. | Moderate: too clayey. | Slight---------- | Poor: small stones. |

TABLE 10.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 217: | | | | | |
| Xerofluvents | Severe: flooding, depth to rock, poor filter. | Severe: seepage, depth to rock, flooding. | Severe: flooding, depth to rock, seepage. | Severe: flooding, depth to rock, seepage. | Poor: depth to rock, too sandy, small stones. |
| Riverwash | Severe: flooding, wetness, poor filter. | Severe: seepage, flooding. | Severe: flooding, seepage, wetness. | Severe: flooding, seepage, wetness. | Poor: too sandy, small stones, wetness. |
| 218: | | | | | |
| Xerorthents | Severe: depth to rock. | Severe: depth to rock, slope. | Severe: depth to rock. | Severe: depth to rock. | Poor: depth to rock, small stones. |
| Rock outcrop | Severe: depth to rock. | Severe: depth to rock, slope. | Severe: depth to rock. | Severe: depth to rock. | Poor: depth to rock. |
| 219: | | | | | |
| Xerorthents | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Severe: depth to rock, slope. | Poor: depth to rock, small stones, slope. |
| Rock outcrop | Severe: depth to rock. | Severe: depth to rock, slope. | Severe: depth to rock. | Severe: depth to rock. | Poor: depth to rock, slope. |

TABLE 11.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 101--Atter | Fair: large stones. | Improbable: thin layer. | Probable | Poor: too sandy, small stones, area reclaim. |
| 102: | | | | |
| Atter | Fair: large stones. | Improbable: thin layer. | Probable | Poor: too sandy, small stones, area reclaim. |
| Dumps | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, too sandy, small stones. |
| Xerofluvents | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, too sandy, small stones. |
| 103: | | | | |
| Bamtush | Fair: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Brownbear | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 104: | | | | |
| Bamtush | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Brownbear | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 105: | | | | |
| Bamtush | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Brownbear | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Weaverville | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |

TABLE 11.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 106: | | | | |
| Bamtush | Fair: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Weaverville | Fair: shrink-swell, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 107: | | | | |
| Bamtush | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Weaverville | Fair: shrink-swell, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Brownbear | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 109: | | | | |
| Barpeak | Poor: slope. | Improbable: small stones. | Probable | Poor: small stones, area reclaim, slope. |
| Sheetiron | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 110: | | | | |
| Beargulch | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Skyrock | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 111: | | | | |
| Brockgulch | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Dedrick | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| Brownbear | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |

TABLE 11.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 112: | | | | |
| Brownbear | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Bamtush | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 113, 114<br>Brownscreek | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 115: | | | | |
| Brownscreek | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Dedrick | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 116, 117: | | | | |
| Brownscreek | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Dougcity | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 118, 119: | | | | |
| Cargent | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Demogul | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 120, 121<br>Caris | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 122: | | | | |
| Caris | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Indleton | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |

TABLE 11.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 122: Hoosimbim | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 123, 124--- Carrcreek | Good | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim. |
| 125--- Choop | Poor: depth to rock, slope. | Improbable: thin layer. | Improbable: thin layer. | Poor: depth to rock, small stones, slope. |
| 126: Choop | Poor: depth to rock, slope. | Improbable: thin layer. | Improbable: thin layer. | Poor: depth to rock, small stones, slope. |
| Rock outcrop. | | | | |
| 127, 128--- Crefork | Poor: low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, small stones. |
| 129--- Crefork | Poor: low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, small stones, slope. |
| 131: Crefork | Poor: low strength, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, small stones, slope. |
| Musserhill | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 132--- Dedrick | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 133: Dedrick | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| Rock outcrop. | | | | |
| 134--- Demogul | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |

TABLE 11.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 136: | | | | |
| Dougcity | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Dedrick | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 137: | | | | |
| Dougcity | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Demogul | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 138---------- Dubakella | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 139, 140, 141--------- Dubakella | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 142---------- Etsel | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 143: | | | | |
| Etsel | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| Bamtush | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 144: | | | | |
| Etsel | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| Weitchpec | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 145: | | | | |
| Goulding | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |

TABLE 11.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 145: | | | | |
| Holkat Variant | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Marpa Variant | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, small stones, slope. |
| 146: | | | | |
| Goulding | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| Vitzthum | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| Vanvor | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 147, 148 Haploxerolls | Good | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim. |
| 149, 150, 151, 152 Haysum | Good | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim. |
| 153, 154: | | | | |
| Holkat | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Hoosimbim | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 155: | | | | |
| Holkat Variant | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Dedrick | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 156 Hoosimbim | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |

TABLE 11.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 157: | | | | |
| Hoosimbim | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Bamtush | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Marpa | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 158: | | | | |
| Hoosimbim | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Etsel | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 159: | | | | |
| Hoosimbim | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Goulding | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 160--Hotaw | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: slope. |
| 161--Hotaw | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: slope. |
| 162: | | | | |
| Indleton | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Caris | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Hoosimbim | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 163, 164--Jafa | Fair: shrink-swell. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim. |

TABLE 11.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 165, 166--- Jafa | Good--- | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim. |
| 167--- Jafa | Fair: shrink-swell, thin layer, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 170: Marpa--- | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Hoosimbim--- | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 171: Marpa--- | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Hoosimbim--- | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Bamtush--- | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 172: Marpa--- | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Vitzthum--- | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 173: Marpa Variant--- | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, small stones, slope. |
| Goulding--- | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| Holkat Variant--- | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 175--- Millsholm | Poor: area reclaim. | Improbable: excess fines. | Improbable: excess fines. | Poor: area reclaim. |

TABLE 11.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 176: | | | | |
| Millsholm | Poor: area reclaim. | Improbable: excess fines. | Improbable: excess fines. | Poor: area reclaim, slope. |
| Azule | Poor: depth to rock, shrink-swell, low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, small stones, slope. |
| 177--- Minersville | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 178: | | | | |
| Minersville Variant | Poor: depth to rock, slope. | Improbable: thin layer. | Improbable: thin layer. | Poor: small stones, slope. |
| Choop | Poor: depth to rock, slope. | Improbable: thin layer. | Improbable: thin layer. | Poor: depth to rock, small stones, slope. |
| 179--- Musserhill | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 180--- Musserhill | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 181: | | | | |
| Musserhill | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Weaverville | Fair: shrink-swell, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 182: | | | | |
| Musserhill | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Weaverville | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 183: | | | | |
| Musserhill | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Weaverville | Fair: shrink-swell, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Urban land. | | | | |

TABLE 11.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 184--- Musserhill Variant | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, small stones, slope. |
| 185: Pardaloe--- | Poor: slope. | Improbable: small stones. | Probable--- | Poor: small stones, area reclaim, slope. |
| Dedrick--- | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 186: Pardaloe--- | Poor: slope. | Improbable: small stones. | Probable--- | Poor: small stones, area reclaim, slope. |
| Goulding--- | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 188--- Rock outcrop | Poor: depth to rock. | --- | --- | Poor: depth to rock. |
| 189: Rock outcrop--- | Poor: depth to rock, slope. | --- | --- | Poor: depth to rock, slope. |
| Dedrick--- | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 190--- Sheetiron | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 191: Sheetiron--- | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Barpeak--- | Poor: slope. | Improbable: small stones. | Probable--- | Poor: small stones, area reclaim, slope. |
| 192: Sheetiron Variant--- | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |

TABLE 11.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 192: | | | | |
| Dedrick | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 193 | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| Skyrock | | | | |
| 194: | | | | |
| Skyrock | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| Rock outcrop. | | | | |
| 195: | | | | |
| Skyrock Variant | Poor: depth to rock, large stones, slope. | Improbable: excess fines, large stones. | Improbable: excess fines, large stones. | Poor: depth to rock, large stones, slope. |
| Rock outcrop | Poor: depth to rock, slope. | --- | --- | Poor: depth to rock, slope. |
| 196: | | | | |
| Skyrock Variant | Poor: depth to rock, large stones, slope. | Improbable: excess fines, large stones. | Improbable: excess fines, large stones. | Poor: depth to rock, large stones, slope. |
| Rock outcrop. | | | | |
| Rubble land. | | | | |
| 197: | | | | |
| Springgulch | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, small stones, area reclaim. |
| Brockgulch Variant | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 198, 199: | | | | |
| Tallowbox | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Minersville | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 201: | | | | |
| Urban land. | | | | |

TABLE 11.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 201: | | | | |
| Xeralfs | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 202: | | | | |
| Valcreek | Poor: depth to rock, slope. | Improbable: thin layer. | Improbable: thin layer. | Poor: small stones, slope. |
| Choop | Poor: depth to rock, slope. | Improbable: thin layer. | Improbable: thin layer. | Poor: depth to rock, small stones, slope. |
| 203: | | | | |
| Valcreek | Poor: depth to rock, slope. | Improbable: thin layer. | Improbable: thin layer. | Poor: small stones, slope. |
| Minersville | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 204: | | | | |
| Valcreek | Poor: depth to rock, slope. | Improbable: thin layer. | Improbable: thin layer. | Poor: small stones, slope. |
| Minersville | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Choop | Poor: depth to rock, slope. | Improbable: thin layer. | Improbable: thin layer. | Poor: depth to rock, small stones, slope. |
| 205, 206: | | | | |
| Vanvor | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Hoosimbim | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 207: | | | | |
| Vitzthum | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| Cargent | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |

TABLE 11.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 208--Weaverville | Fair: shrink-swell, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 209--Weaverville | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 210: | | | | |
| Weitchpec | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| Dubakella | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, slope. |
| 211: | | | | |
| Weitchpec Variant | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Bamtush Variant very gravelly loam | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Bamtush Variant loam | Fair: shrink-swell, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 212: | | | | |
| Weitchpec Variant | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| Bamtush Variant | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim, slope. |
| 213: | | | | |
| Xeralfs | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| Xerorthents | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| 215--Xererts | Poor: shrink-swell, low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, small stones. |

TABLE 11.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 216: | | | | |
| Xererts | Poor: shrink-swell, low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, small stones. |
| Haysum | Good | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, area reclaim. |
| 217: | | | | |
| Xerofluvents | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, too sandy, small stones. |
| Riverwash | Poor: wetness. | Improbable: excess fines. | Improbable: excess fines. | Poor: too sandy, small stones, area reclaim. |
| 218: | | | | |
| Xerorthents | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones. |
| Rock outcrop | Poor: depth to rock. | --- | --- | Poor: depth to rock. |
| 219: | | | | |
| Xerorthents | Poor: depth to rock, slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: depth to rock, small stones, slope. |
| Rock outcrop | Poor: depth to rock, slope. | --- | --- | Poor: depth to rock, slope. |

TABLE 12.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

| Soil name and map symbol | Limitations for-- | | Features affecting-- | | | |
|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| 101---------- Atter | Severe: seepage, slope. | Severe: seepage, large stones. | Deep to water | Slope, large stones, droughty. | Slope, large stones, too sandy. | Large stones, slope, droughty. |
| 102: | | | | | | |
| Atter---------- | Severe: seepage. | Severe: seepage, large stones. | Deep to water | Slope, large stones, droughty. | Large stones, too sandy. | Large stones, droughty. |
| Dumps---------- | Severe: seepage, depth to rock. | Severe: seepage. | Deep to water | Slope, droughty, fast intake. | Large stones, depth to rock. | Large stones, droughty. |
| Xerofluvents----- | Severe: seepage, depth to rock. | Severe: seepage. | Deep to water | Slope, droughty, fast intake. | Large stones, depth to rock. | Large stones, droughty. |
| 103, 104: | | | | | | |
| Bamtush---------- | Severe: slope. | Slight--------- | Deep to water | Slope, droughty. | Slope---------- | Slope, droughty. |
| Brownbear-------- | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 105: | | | | | | |
| Bamtush---------- | Severe: slope. | Slight--------- | Deep to water | Slope, droughty. | Slope---------- | Slope, droughty. |
| Brownbear-------- | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Weaverville------ | Severe: slope. | Severe: hard to pack. | Deep to water | Slope---------- | Slope---------- | Slope. |
| 106: | | | | | | |
| Bamtush---------- | Severe: slope. | Slight--------- | Deep to water | Slope, droughty. | Slope---------- | Slope, droughty. |
| Weaverville------ | Severe: slope. | Severe: hard to pack. | Deep to water | Slope---------- | Slope---------- | Slope. |
| 107: | | | | | | |
| Bamtush---------- | Severe: slope. | Slight--------- | Deep to water | Slope, droughty. | Slope---------- | Slope, droughty. |
| Weaverville------ | Severe: slope. | Severe: hard to pack. | Deep to water | Slope---------- | Slope---------- | Slope. |
| Brownbear-------- | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |

TABLE 12.--WATER MANAGEMENT--Continued

| Soil name and map symbol | Limitations for-- | | Features affecting-- | | | |
|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| 109: | | | | | | |
| Barpeak---------- | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty. | Slope, large stones. | Large stones, slope, droughty. |
| Sheetiron-------- | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 110: | | | | | | |
| Beargulch-------- | Severe: slope. | Severe: seepage. | Deep to water | Slope, large stones, droughty. | Slope, large stones. | Large stones, slope, droughty. |
| Skyrock---------- | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 111: | | | | | | |
| Brockgulch------- | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Dedrick---------- | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| Brownbear-------- | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 112: | | | | | | |
| Brownbear-------- | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Bamtush---------- | Severe: slope. | Slight--------- | Deep to water | Slope, droughty. | Slope---------- | Slope, droughty. |
| 113, 114---------- Brownscreek | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 115: | | | | | | |
| Brownscreek------ | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Dedrick---------- | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 116, 117: | | | | | | |
| Brownscreek------ | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Dougcity--------- | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty. | Slope---------- | Slope, droughty. |

TABLE 12.--WATER MANAGEMENT--Continued

| Soil name and map symbol | Limitations for-- | | Features affecting-- | | | |
|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| 118, 119: | | | | | | |
| Cargent | Severe: slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| Demogul | Severe: slope. | Moderate: piping. | Deep to water | Slope | Slope | Slope. |
| 120, 121 Caris | Severe: slope. | Moderate: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 122: | | | | | | |
| Caris | Severe: slope. | Moderate: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Indleton | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty. | Slope | Slope, droughty. |
| Hoosimbim | Severe: slope. | Moderate: thin layer. | Deep to water | Slope, droughty. | Slope | Slope, droughty. |
| 123 Carrcreek | Moderate: seepage. | Slight | Deep to water | Droughty | Favorable | Droughty. |
| 124 Carrcreek | Moderate: seepage, slope. | Slight | Deep to water | Slope, droughty. | Favorable | Droughty. |
| 125 Choop | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, fast intake. | Slope, depth to rock, too sandy. | Slope, droughty, depth to rock. |
| 126: | | | | | | |
| Choop | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, fast intake. | Slope, depth to rock, too sandy. | Slope, droughty, depth to rock. |
| Rock outcrop. | | | | | | |
| 127 Crefork | Moderate: slope. | Moderate: hard to pack. | Deep to water | Slope, percs slowly. | Percs slowly | Percs slowly. |
| 128, 129 Crefork | Severe: slope. | Moderate: hard to pack. | Deep to water | Slope, percs slowly. | Slope, percs slowly. | Slope, percs slowly. |
| 131: | | | | | | |
| Crefork | Severe: slope. | Moderate: hard to pack. | Deep to water | Slope, percs slowly. | Slope, percs slowly. | Slope, percs slowly. |
| Musserhill | Severe: slope. | Moderate: thin layer, large stones. | Deep to water | Slope, large stones, droughty. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 132 Dedrick | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |

TABLE 12.--WATER MANAGEMENT--Continued

| Soil name and map symbol | Limitations for-- | | Features affecting-- | | | |
|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| 133: | | | | | | |
| Dedrick | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| Rock outcrop. | | | | | | |
| 134--- Demogul | Severe: slope. | Moderate: piping. | Deep to water | Slope--- | Slope--- | Slope. |
| 136: | | | | | | |
| Dougcity | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty. | Slope--- | Slope, droughty. |
| Dedrick | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 137: | | | | | | |
| Dougcity | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty. | Slope--- | Slope, droughty. |
| Demogul | Severe: slope. | Moderate: piping. | Deep to water | Slope--- | Slope--- | Slope. |
| 138, 139, 140--- Dubakella | Severe: slope. | Moderate: large stones. | Deep to water | Slope, large stones, droughty. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 141--- Dubakella | Severe: slope. | Severe: thin layer. | Deep to water | Slope, large stones, droughty. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 142--- Etsel | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 143: | | | | | | |
| Etsel | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Bamtush | Severe: slope. | Slight--- | Deep to water | Slope, droughty. | Slope--- | Slope, droughty. |
| 144: | | | | | | |
| Etsel | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Weitchpec | Severe: slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 145: | | | | | | |
| Goulding | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |

TABLE 12.--WATER MANAGEMENT--Continued

| Soil name and map symbol | Limitations for-- | | Features affecting-- | | | |
|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| 145: | | | | | | |
| Holkat Variant--- | Severe: slope. | Moderate: thin layer, piping. | Deep to water | Slope, depth to rock. | Slope, depth to rock. | Slope, depth to rock. |
| Marpa Variant---- | Severe: slope. | Moderate: thin layer, large stones. | Deep to water | Slope, large stones, droughty. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 146: | | | | | | |
| Goulding--------- | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Vitzthum--------- | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Vanvor----------- | Severe: slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 147---------- Haploxerolls | Severe: seepage. | Severe: seepage. | Deep to water | Droughty------- | Favorable------ | Droughty. |
| 148---------- Haploxerolls | Severe: seepage. | Severe: seepage. | Deep to water | Slope, droughty. | Favorable------ | Droughty. |
| 149---------- Haysum | Moderate: seepage, slope. | Moderate: piping. | Deep to water | Slope, erodes easily. | Erodes easily | Erodes easily. |
| 150---------- Haysum | Moderate: seepage. | Moderate: piping. | Deep to water | Favorable------ | Favorable------ | Favorable. |
| 151, 152---------- Haysum | Moderate: seepage, slope. | Moderate: piping. | Deep to water | Slope---------- | Favorable------ | Favorable. |
| 153, 154: | | | | | | |
| Holkat----------- | Severe: slope. | Severe: thin layer. | Deep to water | Slope, depth to rock. | Slope, depth to rock. | Slope, depth to rock. |
| Hoosimbim-------- | Severe: slope. | Moderate: thin layer. | Deep to water | Slope, droughty. | Slope---------- | Slope, droughty. |
| 155: | | | | | | |
| Holkat Variant--- | Severe: slope. | Moderate: thin layer, piping. | Deep to water | Slope, depth to rock. | Slope, depth to rock. | Slope, depth to rock. |
| Dedrick---------- | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 156---------- Hoosimbim | Severe: slope. | Moderate: thin layer. | Deep to water | Slope, droughty. | Slope---------- | Slope, droughty. |
| 157: | | | | | | |
| Hoosimbim-------- | Severe: slope. | Moderate: thin layer. | Deep to water | Slope, droughty. | Slope---------- | Slope, droughty. |

TABLE 12.--WATER MANAGEMENT--Continued

| Soil name and map symbol | Limitations for-- | | Features affecting-- | | | |
|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| 157: | | | | | | |
| Bamtush | Severe: slope. | Slight | Deep to water | Slope, droughty. | Slope | Slope, droughty. |
| Marpa | Severe: slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 158: | | | | | | |
| Hoosimbim | Severe: slope. | Moderate: thin layer. | Deep to water | Slope, droughty. | Slope | Slope, droughty. |
| Etsel | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 159: | | | | | | |
| Hoosimbim | Severe: slope. | Moderate: thin layer. | Deep to water | Slope, droughty. | Slope | Slope, droughty. |
| Goulding | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 160, 161 Hotaw | Severe: slope. | Moderate: thin layer, piping. | Deep to water | Slope, depth to rock. | Slope, depth to rock. | Slope, depth to rock. |
| 162: | | | | | | |
| Indleton | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty. | Slope | Slope, droughty. |
| Caris | Severe: slope. | Moderate: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Hoosimbim | Severe: slope. | Moderate: thin layer. | Deep to water | Slope, droughty. | Slope | Slope, droughty. |
| 163 Jafa | Moderate: seepage, slope. | Moderate: piping. | Deep to water | Slope | Favorable | Favorable. |
| 164 Jafa | Severe: slope. | Moderate: piping. | Deep to water | Slope | Slope | Slope. |
| 165 Jafa | Slight | Slight | Deep to water | Droughty | Favorable | Droughty. |
| 166 Jafa | Moderate: slope. | Slight | Deep to water | Slope, droughty. | Favorable | Droughty. |
| 167 Jafa | Severe: slope. | Slight | Deep to water | Slope, droughty, percs slowly. | Slope | Slope, droughty. |
| 170: | | | | | | |
| Marpa | Severe: slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Hoosimbim | Severe: slope. | Moderate: thin layer. | Deep to water | Slope, droughty. | Slope | Slope, droughty. |

TABLE 12.--WATER MANAGEMENT--Continued

| Soil name and map symbol | Limitations for-- | | Features affecting-- | | | |
|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| 171: | | | | | | |
| Marpa | Severe: slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Hoosimbim | Severe: slope. | Moderate: thin layer. | Deep to water | Slope, droughty. | Slope | Slope, droughty. |
| Bamtush | Severe: slope. | Slight | Deep to water | Slope, droughty. | Slope | Slope, droughty. |
| 172: | | | | | | |
| Marpa | Severe: slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Vitzthum | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 173: | | | | | | |
| Marpa Variant | Severe: slope. | Moderate: thin layer, large stones. | Deep to water | Slope, large stones, droughty. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| Goulding | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Holkat Variant | Severe: slope. | Moderate: thin layer, piping. | Deep to water | Slope, depth to rock. | Slope, depth to rock. | Slope, depth to rock. |
| 175 Millsholm | Severe: depth to rock. | Severe: thin layer, piping. | Deep to water | Slope, depth to rock, erodes easily. | Depth to rock, erodes easily. | Erodes easily, depth to rock. |
| 176: | | | | | | |
| Millsholm | Severe: depth to rock, slope. | Severe: thin layer, piping. | Deep to water | Slope, depth to rock, erodes easily. | Slope, depth to rock, erodes easily. | Slope, erodes easily, depth to rock. |
| Azule | Severe: slope. | Severe: thin layer. | Deep to water | Slope, percs slowly, depth to rock. | Slope, depth to rock. | Slope, depth to rock. |
| 177 Minersville | Severe: seepage, slope. | Severe: thin layer. | Deep to water | Slope, droughty, soil blowing. | Slope, soil blowing. | Slope, droughty. |
| 178: | | | | | | |
| Minersville Variant | Severe: seepage, slope. | Severe: seepage. | Deep to water | Droughty, fast intake, depth to rock. | Slope, depth to rock, too sandy. | Slope, droughty, depth to rock. |
| Choop | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, fast intake. | Slope, depth to rock, too sandy. | Slope, droughty, depth to rock. |
| 179, 180 Musserhill | Severe: slope. | Moderate: thin layer, large stones. | Deep to water | Slope, large stones, droughty. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |

TABLE 12.--WATER MANAGEMENT--Continued

| Soil name and map symbol | Limitations for-- | | Features affecting-- | | | |
|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| 181, 182: | | | | | | |
| Musserhill | Severe: slope. | Moderate: thin layer, large stones. | Deep to water | Slope, large stones, droughty. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| Weaverville | Severe: slope. | Severe: hard to pack. | Deep to water | Slope | Slope | Slope. |
| 183: | | | | | | |
| Musserhill | Severe: slope. | Moderate: thin layer, large stones. | Deep to water | Slope, large stones, droughty. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| Weaverville | Severe: slope. | Severe: hard to pack. | Deep to water | Slope | Slope | Slope. |
| Urban land. | | | | | | |
| 184--- Musserhill Variant | Severe: slope. | Severe: thin layer. | Deep to water | Slope, percs slowly, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, depth to rock. |
| 185: | | | | | | |
| Pardaloe | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty. | Slope, large stones. | Large stones, slope, droughty. |
| Dedrick | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 186: | | | | | | |
| Pardaloe | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty. | Slope, large stones. | Large stones, slope, droughty. |
| Goulding | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 188--- Rock outcrop | Severe: depth to rock. | Slight | Deep to water | Slope, depth to rock. | Depth to rock | Depth to rock. |
| 189: | | | | | | |
| Rock outcrop | Severe: depth to rock, slope. | Slight | Deep to water | Slope, depth to rock. | Slope, depth to rock. | Slope, depth to rock. |
| Dedrick | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 190--- Sheetiron | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 191: | | | | | | |
| Sheetiron | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |

TABLE 12.--WATER MANAGEMENT--Continued

| Soil name and map symbol | Limitations for-- | | Features affecting-- | | | |
|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| 191: | | | | | | |
| Barpeak---------- | Severe: slope. | Severe: seepage. | Deep to water | Slope, droughty. | Slope, large stones. | Large stones, slope, droughty. |
| 192: | | | | | | |
| Sheetiron Variant | Severe: slope. | Moderate: thin layer, seepage. | Deep to water | Slope, depth to rock. | Slope, depth to rock. | Slope, depth to rock. |
| Dedrick---------- | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 193---------- Skyrock | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 194: | | | | | | |
| Skyrock---------- | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Rock outcrop. | | | | | | |
| 195: | | | | | | |
| Skyrock Variant-- | Severe: depth to rock, slope. | Severe: thin layer, large stones. | Deep to water | Slope, large stones, droughty. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| Rock outcrop----- | Severe: depth to rock, slope. | Slight--------- | Deep to water | Slope, depth to rock. | Slope, depth to rock. | Slope, depth to rock. |
| 196: | | | | | | |
| Skyrock Variant-- | Severe: depth to rock, slope. | Severe: thin layer, large stones. | Deep to water | Slope, large stones, droughty. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| Rock outcrop. | | | | | | |
| Rubble land. | | | | | | |
| 197: | | | | | | |
| Springgulch------ | Severe: slope. | Severe: hard to pack. | Deep to water | Slope---------- | Slope---------- | Slope. |
| Brockgulch Variant---------- | Severe: slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 198, 199: | | | | | | |
| Tallowbox-------- | Severe: seepage, slope. | Severe: seepage. | Deep to water | Slope, droughty, soil blowing. | Slope, depth to rock, soil blowing. | Slope, droughty, depth to rock. |
| Minersville------ | Severe: seepage, slope. | Severe: thin layer. | Deep to water | Slope, droughty, soil blowing. | Slope, soil blowing. | Slope, droughty. |

TABLE 12.--WATER MANAGEMENT--Continued

| Soil name and map symbol | Limitations for-- | | Features affecting-- | | | |
|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| 201: Urban land. | | | | | | |
| Xeralfs | Severe: seepage, depth to rock, slope. | Moderate: thin layer, piping. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 202: | | | | | | |
| Valcreek | Severe: seepage, slope. | Severe: seepage. | Deep to water | Droughty, fast intake, depth to rock. | Slope, depth to rock, too sandy. | Slope, droughty, depth to rock. |
| Choop | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, fast intake. | Slope, depth to rock, too sandy. | Slope, droughty, depth to rock. |
| 203: | | | | | | |
| Valcreek | Severe: seepage, slope. | Severe: seepage. | Deep to water | Droughty, fast intake, depth to rock. | Slope, depth to rock, too sandy. | Slope, droughty, depth to rock. |
| Minersville | Severe: seepage, slope. | Severe: thin layer. | Deep to water | Slope, droughty, soil blowing. | Slope, soil blowing. | Slope, droughty. |
| 204: | | | | | | |
| Valcreek | Severe: seepage, slope. | Severe: seepage. | Deep to water | Droughty, fast intake, depth to rock. | Slope, depth to rock, too sandy. | Slope, droughty, depth to rock. |
| Minersville | Severe: seepage, slope. | Severe: thin layer. | Deep to water | Slope, droughty, soil blowing. | Slope, soil blowing. | Slope, droughty. |
| Choop | Severe: depth to rock, slope. | Severe: thin layer, seepage. | Deep to water | Slope, droughty, fast intake. | Slope, depth to rock, too sandy. | Slope, droughty, depth to rock. |
| 205, 206: | | | | | | |
| Vanvor | Severe: slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Hoosimbim | Severe: slope. | Moderate: thin layer. | Deep to water | Slope, droughty. | Slope | Slope, droughty. |
| 207: | | | | | | |
| Vitzthum | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Cargent | Severe: slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 208, 209 Weaverville | Severe: slope. | Severe: hard to pack. | Deep to water | Slope | Slope | Slope. |

TABLE 12.--WATER MANAGEMENT--Continued

| Soil name and map symbol | Limitations for-- | | Features affecting-- | | | |
|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| 210: | | | | | | |
| Weitchpec | Severe: slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Dubakella | Severe: slope. | Moderate: large stones. | Deep to water | Slope, large stones, droughty. | Slope, large stones, depth to rock. | Large stones, slope, droughty. |
| 211: | | | | | | |
| Weitchpec Variant | Severe: slope. | Moderate: thin layer, large stones. | Deep to water | Slope, droughty. | Slope, large stones. | Large stones, slope, droughty. |
| Bamtush Variant very gravelly loam | Severe: slope. | Moderate: large stones. | Deep to water | Slope, droughty. | Slope, large stones. | Large stones, slope, droughty. |
| Bamtush Variant loam | Severe: slope. | Moderate: large stones. | Deep to water | Slope, droughty. | Slope, large stones. | Large stones, slope, droughty. |
| 212: | | | | | | |
| Weitchpec Variant | Severe: slope. | Moderate: thin layer, large stones. | Deep to water | Slope, droughty. | Slope, large stones. | Large stones, slope, droughty. |
| Bamtush Variant-- | Severe: slope. | Moderate: large stones. | Deep to water | Slope, droughty. | Slope, large stones. | Large stones, slope, droughty. |
| 213: | | | | | | |
| Xeralfs | Severe: seepage, depth to rock, slope. | Moderate: thin layer, piping. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Xerorthents | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| 215--- Xererts | Severe: slope. | Severe: hard to pack. | Deep to water | Slope, percs slowly. | Slope, percs slowly. | Slope, percs slowly. |
| 216: | | | | | | |
| Xererts | Moderate: depth to rock, slope. | Severe: hard to pack. | Deep to water | Slope, percs slowly. | Percs slowly--- | Percs slowly. |
| Haysum | Moderate: seepage, slope. | Moderate: piping. | Deep to water | Slope, erodes easily. | Erodes easily | Erodes easily. |
| 217: | | | | | | |
| Xerofluvents | Severe: seepage, depth to rock. | Severe: seepage. | Deep to water | Droughty, fast intake. | Large stones, depth to rock. | Large stones, droughty. |

TABLE 12.--WATER MANAGEMENT--Continued

| Soil name and map symbol | Limitations for-- | | Features affecting-- | | | |
|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| 217: | | | | | | |
| Riverwash-------- | Severe: seepage. | Severe: seepage, wetness. | Flooding, cutbanks cave. | Wetness, droughty. | Large stones, wetness. | Large stones, wetness. |
| 218, 219: | | | | | | |
| Xerorthents------ | Severe: depth to rock, slope. | Severe: thin layer. | Deep to water | Slope, droughty, depth to rock. | Slope, depth to rock. | Slope, droughty, depth to rock. |
| Rock outcrop----- | Severe: depth to rock, slope. | Slight--------- | Deep to water | Slope, depth to rock. | Slope, depth to rock. | Slope, depth to rock. |

TABLE 13.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 101---------- Atter | 0-8 | Extremely gravelly loamy sand. | GP-GM | A-1 | 5-15 | 20-30 | 15-25 | 10-20 | 5-10 | --- | NP |
| | 8-60 | Stratified extremely gravelly loamy sand to extremely gravelly sandy loam. | GP-GM | A-1 | 5-15 | 20-30 | 15-25 | 10-20 | 5-10 | --- | NP |
| 102: | | | | | | | | | | | |
| Atter---------- | 0-8 | Extremely gravelly loamy sand. | GP-GM | A-1 | 5-15 | 20-30 | 15-25 | 10-20 | 5-10 | --- | NP |
| | 8-60 | Stratified extremely gravelly loamy sand to extremely gravelly sandy loam. | GP-GM | A-1 | 5-15 | 20-30 | 15-25 | 10-20 | 5-10 | --- | NP |
| Dumps---------- | 0-5 | Gravelly sand---- | SP-SM | A-1 | 0-15 | 60-80 | 50-75 | 25-50 | 5-10 | --- | NP |
| | 5-60 | Extremely gravelly coarse sand, very gravelly fine sandy loam. | GM | A-1 | 0-20 | 35-55 | 25-50 | 15-40 | 0-25 | 10-20 | NP-5 |
| Xerofluvents---- | 0-5 | Gravelly sand---- | SP-SM | A-1 | 0-15 | 60-80 | 50-75 | 25-50 | 5-10 | --- | NP |
| | 5-60 | Extremely gravelly coarse sand, very gravelly fine sandy loam. | GM | A-1 | 0-20 | 35-55 | 25-50 | 15-40 | 0-25 | 10-20 | NP-5 |
| 103, 104: | | | | | | | | | | | |
| Bamtush--------- | 0-6 | Extremely gravelly loam. | GP-GM, GM, GM-GC | A-2, A-1 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | 5-10 |
| | 6-14 | Very gravelly loam. | GM-GC, GC | A-2, A-1 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 25-35 | 5-15 |
| | 14-67 | Very gravelly clay loam, very gravelly loam, very gravelly sandy clay loam. | GC | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 30-40 | 10-20 |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Fragments | Percentage passing sieve number-- | | | | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 103, 104: | | | | | | | | | | | |
| Brownbear------- | 0-4 | Very gravelly loam. | GM-GC, GM | A-2 | 0-10 | 30-55 | 25-50 | 20-45 | 15-35 | 25-35 | 5-10 |
| | 4-9 | Very gravelly loam, very gravelly clay loam. | GM, GC | A-2, A-4, A-6 | 0-10 | 30-55 | 25-50 | 20-45 | 15-40 | 30-40 | 5-15 |
| | 9-16 | Gravelly clay loam, gravelly loam. | GM, ML, GC, CL | A-4, A-6 | 0-5 | 55-80 | 50-75 | 45-70 | 35-60 | 30-40 | 5-15 |
| | 16-32 | Extremely gravelly clay loam, extremely gravelly loam, very gravelly clay loam. | GM, GC | A-2 | 5-15 | 25-40 | 20-35 | 15-30 | 10-25 | 30-40 | 5-15 |
| | 32-36 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 105: | | | | | | | | | | | |
| Bamtush--------- | 0-6 | Extremely gravelly loam. | GP-GM, GM, GM-GC | A-2, A-1 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | 5-10 |
| | 6-14 | Very gravelly loam. | GM-GC, GC | A-2, A-1 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 25-35 | 5-15 |
| | 14-67 | Very gravelly clay loam, very gravelly loam, very gravelly sandy clay loam. | GC | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 30-40 | 10-20 |
| Brownbear------- | 0-4 | Very gravelly loam. | GM-GC, GM | A-2 | 0-10 | 30-55 | 25-50 | 20-45 | 15-35 | 25-35 | 5-10 |
| | 4-9 | Very gravelly loam, very gravelly clay loam. | GM, GC | A-2, A-4, A-6 | 0-10 | 30-55 | 25-50 | 20-45 | 15-40 | 30-40 | 5-15 |
| | 9-16 | Gravelly clay loam, gravelly loam. | GM, ML, GC, CL | A-4, A-6 | 0-5 | 55-80 | 50-75 | 45-70 | 35-60 | 30-40 | 5-15 |
| | 16-32 | Extremely gravelly clay loam, extremely gravelly loam, very gravelly clay loam. | GM, GC | A-2 | 5-15 | 25-40 | 20-35 | 15-30 | 10-25 | 30-40 | 5-15 |
| | 32-36 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Weaverville----- | 0-4 | Loam---------- | CL-ML, ML | A-4 | 0-5 | 85-95 | 80-90 | 70-85 | 50-60 | 25-35 | 5-10 |
| | 4-56 | Gravelly clay loam, clay loam, gravelly loam. | ML, MH, GM | A-7, A-6 | 0-10 | 70-90 | 65-85 | 60-80 | 40-55 | 35-55 | 10-20 |
| | 56-81 | Very gravelly clay loam, gravelly clay loam, cobbly clay loam. | ML, MH, GM | A-6, A-7 | 5-25 | 60-80 | 55-75 | 50-70 | 40-55 | 35-55 | 10-20 |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Fragments | Percentage passing sieve number-- | | | | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 106: | | | | | | | | | | | |
| Bamtush--------- | 0-6 | Extremely gravelly loam. | GP-GM, GM, GM-GC | A-2, A-1 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | 5-10 |
| | 6-14 | Very gravelly loam. | GM-GC, GC | A-2, A-1 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 25-35 | 5-15 |
| | 14-67 | Very gravelly clay loam, very gravelly loam, very gravelly sandy clay loam. | GC | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 30-40 | 10-20 |
| Weaverville----- | 0-4 | Loam---------- | CL-ML, ML | A-4 | 0-5 | 85-95 | 80-90 | 70-85 | 50-60 | 25-35 | 5-10 |
| | 4-56 | Gravelly clay loam, clay loam, gravelly loam. | ML, MH, GM | A-7, A-6 | 0-10 | 70-90 | 65-85 | 60-80 | 40-55 | 35-55 | 10-20 |
| | 56-81 | Very gravelly clay loam, gravelly clay loam, cobbly clay loam. | ML, MH, GM | A-6, A-7 | 5-25 | 60-80 | 55-75 | 50-70 | 40-55 | 35-55 | 10-20 |
| 107: | | | | | | | | | | | |
| Bamtush--------- | 0-6 | Extremely gravelly loam. | GP-GM, GM, GM-GC | A-2, A-1 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | 5-10 |
| | 6-14 | Very gravelly loam. | GM-GC, GC | A-2, A-1 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 25-35 | 5-15 |
| | 14-67 | Very gravelly clay loam, very gravelly loam, very gravelly sandy clay loam. | GC | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 30-40 | 10-20 |
| Weaverville----- | 0-4 | Loam---------- | CL-ML, ML | A-4 | 0-5 | 85-95 | 80-90 | 70-85 | 50-60 | 25-35 | 5-10 |
| | 4-56 | Gravelly clay loam, clay loam, gravelly loam. | ML, MH, GM | A-7, A-6 | 0-10 | 70-90 | 65-85 | 60-80 | 40-55 | 35-55 | 10-20 |
| | 56-81 | Very gravelly clay loam, gravelly clay loam, cobbly clay loam. | ML, MH, GM | A-6, A-7 | 5-25 | 60-80 | 55-75 | 50-70 | 40-55 | 35-55 | 10-20 |
| Brownbear------- | 0-4 | Very gravelly loam. | GM-GC, GM | A-2 | 0-10 | 30-55 | 25-50 | 20-45 | 15-35 | 25-35 | 5-10 |
| | 4-9 | Very gravelly loam, very gravelly clay loam. | GM, GC | A-2, A-4, A-6 | 0-10 | 30-55 | 25-50 | 20-45 | 15-40 | 30-40 | 5-15 |
| | 9-16 | Gravelly clay loam, gravelly loam. | GM, ML, GC, CL | A-4, A-6 | 0-5 | 55-80 | 50-75 | 45-70 | 35-60 | 30-40 | 5-15 |
| | 16-32 | Extremely gravelly clay loam, extremely gravelly loam, very gravelly clay loam. | GM, GC | A-2 | 5-15 | 25-40 | 20-35 | 15-30 | 10-25 | 30-40 | 5-15 |
| | 32-36 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 109: | | | | | | | | | | | |
| Barpeak--------- | 0-3 | Very gravelly loam. | GM-GC, GM | A-2 | 0-5 | 35-55 | 30-50 | 25-40 | 20-35 | 25-35 | 5-10 |
| | 3-8 | Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam. | GM-GC, GM | A-2 | 0-5 | 25-50 | 20-45 | 15-30 | 10-20 | 25-35 | 5-10 |
| | 8-61 | Extremely gravelly sandy clay loam, extremely gravelly loam, extremely gravelly sandy loam. | GP-GM | A-2 | 10-25 | 15-30 | 10-25 | 5-15 | 5-10 | 25-35 | 5-10 |
| Sheetiron------- | 0-4 | Very gravelly loam. | GM | A-2 | 5-10 | 40-55 | 35-50 | 30-45 | 25-35 | 25-40 | NP-10 |
| | 4-19 | Very gravelly sandy loam, very gravelly loam. | GM | A-1, A-2 | 5-20 | 30-50 | 25-50 | 20-45 | 15-35 | 25-40 | NP-10 |
| | 19-24 | Extremely gravelly loam, extremely gravelly sandy loam. | GM | A-1, A-2 | 5-20 | 25-30 | 20-25 | 15-20 | 10-15 | 25-40 | NP-10 |
| | 24 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 110: | | | | | | | | | | | |
| Beargulch------- | 0-12 | Very gravelly loam. | GM | A-2 | 0-10 | 40-55 | 35-50 | 30-45 | 25-35 | 25-35 | NP-10 |
| | 12-43 | Extremely gravelly sandy loam, extremely gravelly loam, very gravelly loam. | GM | A-1 | 10-30 | 35-45 | 30-40 | 25-30 | 10-20 | 20-30 | NP-5 |
| | 43 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Skyrock--------- | 0-4 | Extremely gravelly loam. | GM, GP-GM | A-1, A-2 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | NP-10 |
| | 4-10 | Very gravelly loam. | GM | A-1, A-2 | 0-5 | 35-50 | 30-45 | 25-40 | 20-30 | 25-35 | NP-10 |
| | 10-18 | Extremely gravelly sandy clay loam, extremely gravelly loam. | GM, GP-GM | A-1, A-2 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | NP-10 |
| | 18-22 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 111: | | | | | | | | | | | |
| Brockgulch------ | 0-3 | Very gravelly loam. | GM-GC, GM | A-2 | 0-5 | 35-55 | 30-50 | 25-50 | 20-35 | 25-35 | 5-10 |
| | 3-16 | Very gravelly loam. | GM-GC, GM | A-2 | 0-5 | 35-55 | 30-50 | 25-50 | 20-35 | 25-35 | 5-10 |
| | 16-24 | Very gravelly loam, extremely gravelly loam, extremely gravelly sandy clay loam. | GM-GC, GM | A-2 | 0-15 | 25-50 | 20-45 | 15-40 | 10-30 | 25-35 | 5-10 |
| | 24-28 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dedrick--------- | 0-3 | Very gravelly loam. | GM | A-1, A-2 | 5-15 | 35-55 | 30-50 | 25-45 | 15-35 | 25-35 | NP-10 |
| | 3-15 | Extremely gravelly loam, very gravelly loam. | GM | A-1, A-2 | 5-25 | 25-50 | 20-45 | 15-40 | 10-30 | 25-35 | NP-10 |
| | 15-19 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Brownbear------- | 0-4 | Very gravelly loam. | GM-GC, GM | A-2 | 0-10 | 30-55 | 25-50 | 20-45 | 15-35 | 25-35 | 5-10 |
| | 4-9 | Very gravelly loam, very gravelly clay loam. | GM, GC | A-2, A-4, A-6 | 0-10 | 30-55 | 25-50 | 20-45 | 15-40 | 30-40 | 5-15 |
| | 9-16 | Gravelly clay loam, gravelly loam. | GM, ML, GC, CL | A-4, A-6 | 0-5 | 55-80 | 50-75 | 45-70 | 35-60 | 30-40 | 5-15 |
| | 16-32 | Extremely gravelly clay loam, extremely gravelly loam, very gravelly clay loam. | GM, GC | A-2 | 5-15 | 25-40 | 20-35 | 15-30 | 10-25 | 30-40 | 5-15 |
| | 32-36 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 112: | | | | | | | | | | | |
| Brownbear------- | 0-4 | Very gravelly loam. | GM-GC, GM | A-2 | 0-10 | 30-55 | 25-50 | 20-45 | 15-35 | 25-35 | 5-10 |
| | 4-9 | Very gravelly loam, very gravelly clay loam. | GM, GC | A-2, A-4, A-6 | 0-10 | 30-55 | 25-50 | 20-45 | 15-40 | 30-40 | 5-15 |
| | 9-16 | Gravelly clay loam, gravelly loam. | GM, ML, GC, CL | A-4, A-6 | 0-5 | 55-80 | 50-75 | 45-70 | 35-60 | 30-40 | 5-15 |
| | 16-32 | Extremely gravelly clay loam, extremely gravelly loam, very gravelly clay loam. | GM, GC | A-2 | 5-15 | 25-40 | 20-35 | 15-30 | 10-25 | 30-40 | 5-15 |
| | 32-36 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 112: | | | | | | | | | | | |
| Bamtush--------- | 0-6 | Extremely gravelly loam. | GP-GM, GM, GM-GC | A-2, A-1 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | 5-10 |
| | 6-14 | Very gravelly loam. | GM-GC, GC | A-2, A-1 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 25-35 | 5-15 |
| | 14-67 | Very gravelly clay loam, very gravelly loam, very gravelly sandy clay loam. | GC | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 30-40 | 10-20 |
| 113, 114--------- Brownscreek | 0-6 | Gravelly loam---- | GM, SM | A-4 | 0-5 | 65-80 | 60-75 | 50-65 | 35-50 | 25-35 | NP-10 |
| | 6-24 | Very gravelly loam, very gravelly clay loam, very gravelly sandy clay loam. | GM | A-2 | 0-5 | 30-55 | 25-50 | 25-50 | 15-35 | 30-45 | 5-15 |
| | 24-34 | Extremely gravelly loam, extremely gravelly clay loam. | GM, GP-GM | A-2 | 0-15 | 20-30 | 15-25 | 10-20 | 5-15 | 30-45 | 5-15 |
| | 34-38 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 115: | | | | | | | | | | | |
| Brownscreek----- | 0-6 | Gravelly loam---- | GM, SM | A-4 | 0-5 | 65-80 | 60-75 | 50-65 | 35-50 | 25-35 | NP-10 |
| | 6-24 | Very gravelly loam, very gravelly clay loam, very gravelly sandy clay loam. | GM | A-2 | 0-5 | 30-55 | 25-50 | 25-50 | 15-35 | 30-45 | 5-15 |
| | 24-34 | Extremely gravelly loam, extremely gravelly clay loam. | GM, GP-GM | A-2 | 0-15 | 20-30 | 15-25 | 10-20 | 5-15 | 30-45 | 5-15 |
| | 34-38 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dedrick--------- | 0-3 | Very gravelly loam. | GM | A-1, A-2 | 5-15 | 35-55 | 30-50 | 25-45 | 15-35 | 25-35 | NP-10 |
| | 3-15 | Extremely gravelly loam, very gravelly loam. | GM | A-1, A-2 | 5-25 | 25-50 | 20-45 | 15-40 | 10-30 | 25-35 | NP-10 |
| | 15-19 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 116, 117: | | | | | | | | | | | |
| Brownscreek----- | 0-6 | Gravelly loam---- | GM, SM | A-4 | 0-5 | 65-80 | 60-75 | 50-65 | 35-50 | 25-35 | NP-10 |
| | 6-24 | Very gravelly loam, very gravelly clay loam, very gravelly sandy clay loam. | GM | A-2 | 0-5 | 30-55 | 25-50 | 25-50 | 15-35 | 30-45 | 5-15 |
| | 24-34 | Extremely gravelly loam, extremely gravelly clay loam. | GM, GP-GM | A-2 | 0-15 | 20-30 | 15-25 | 10-20 | 5-15 | 30-45 | 5-15 |
| | 34-38 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dougcity-------- | 0-13 | Gravelly loam---- | SC-SM, SM, GM-GC, GM | A-4 | 0 | 65-80 | 60-75 | 50-65 | 35-50 | 25-35 | 5-10 |
| | 13-80 | Very gravelly clay loam, very gravelly loam. | GM | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 35-50 | 10-20 |
| 118, 119: | | | | | | | | | | | |
| Cargent--------- | 0-3 | Very gravelly sandy clay loam. | GM-GC, GM | A-2, A-1 | 0-10 | 40-55 | 35-50 | 30-45 | 15-25 | 25-35 | 5-10 |
| | 3-21 | Very gravelly clay loam, very gravelly loam. | GM-GC, GM | A-2, A-1 | 5-20 | 40-55 | 35-50 | 30-50 | 20-35 | 25-35 | 5-10 |
| | 21-32 | Extremely gravelly loam, extremely gravelly clay loam. | GP-GM, GM-GC, GM | A-2, A-1 | 5-20 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | 5-10 |
| | 32-36 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Demogul--------- | 0-4 | Gravelly loam---- | SC-SM, GM-GC | A-4 | 0-5 | 60-80 | 55-75 | 50-65 | 40-50 | 25-30 | 5-10 |
| | 4-34 | Gravelly clay loam, gravelly sandy clay loam. | GM, ML | A-6, A-7 | 0-5 | 60-80 | 55-75 | 50-70 | 35-55 | 35-50 | 10-20 |
| | 34-68 | Gravelly clay loam, very gravelly clay loam, very gravelly sandy clay loam. | GM | A-2, A-6, A-7 | 0-5 | 45-65 | 40-60 | 35-55 | 30-45 | 35-50 | 10-20 |
| 120, 121--------- Caris | 0-3 | Extremely gravelly sandy loam. | GP-GM, GP-GC | A-1, A-2 | 0-5 | 20-30 | 15-25 | 15-20 | 5-10 | 20-30 | NP-10 |
| | 3-33 | Very gravelly loam, extremely gravelly sandy loam, extremely gravelly loam. | GM-GC, GP-GC | A-2, A-1 | 0-5 | 20-45 | 15-40 | 10-35 | 5-25 | 25-30 | 5-10 |
| | 33 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 122: | | | | | | | | | | | |
| Caris | 0-3 | Extremely gravelly sandy loam. | GP-GM, GP-GC | A-1, A-2 | 0-5 | 20-30 | 15-25 | 15-20 | 5-10 | 20-30 | NP-10 |
| | 3-33 | Very gravelly loam, extremely gravelly sandy loam, extremely gravelly loam. | GM-GC, GP-GC | A-2, A-1 | 0-5 | 20-45 | 15-40 | 10-35 | 5-25 | 25-30 | 5-10 |
| | 33 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Indleton | 0-11 | Extremely gravelly sandy loam. | GM | A-1 | 0-5 | 25-30 | 20-25 | 15-20 | 10-15 | 20-30 | NP-5 |
| | 11-22 | Extremely gravelly sandy loam, extremely gravelly loam. | GM | A-1 | 0-15 | 25-30 | 20-25 | 15-20 | 10-15 | 20-30 | NP-5 |
| | 22-60 | Extremely gravelly sandy clay loam, very gravelly loam, extremely gravelly sandy loam. | GM | A-1, A-2 | 5-15 | 25-45 | 20-40 | 15-35 | 10-30 | 25-35 | NP-10 |
| Hoosimbim | 0-4 | Extremely gravelly sandy loam. | GP-GM | A-1 | 0-5 | 20-30 | 15-25 | 10-15 | 5-10 | 20-30 | NP-5 |
| | 4-16 | Very gravelly sandy clay loam, very gravelly clay loam. | GC | A-2 | 0-10 | 30-50 | 25-45 | 20-40 | 10-35 | 30-40 | 10-20 |
| | 16-42 | Extremely gravelly sandy clay loam. | GP-GC, GC | A-2 | 5-10 | 15-30 | 10-25 | 5-20 | 5-15 | 30-40 | 10-20 |
| | 42-46 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 123, 124<br>Carrcreek | 0-12 | Gravelly loam | GM-GC, GM, SC-SM, SM | A-4 | 0-10 | 55-85 | 50-75 | 45-65 | 35-50 | 25-35 | 5-10 |
| | 12-50 | Very gravelly clay loam, very gravelly loam. | GC | A-2 | 0 | 35-55 | 30-50 | 25-45 | 20-35 | 30-40 | 10-20 |
| | 50-60 | Very gravelly sandy clay loam. | GC | A-2 | 0 | 35-55 | 30-50 | 25-45 | 10-25 | 30-40 | 10-20 |
| 125<br>Choop | 0-5 | Fine gravelly loamy coarse sand. | SM | A-1 | 0 | 70-95 | 50-75 | 25-50 | 10-25 | --- | NP |
| | 5-16 | Very gravelly loamy coarse sand, extremely gravelly loamy coarse sand. | GP-GM, GM, SP-SM, SM | A-1 | 0 | 40-75 | 20-50 | 10-30 | 5-15 | --- | NP |
| | 16-20 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 126: | | | | | | | | | | | |
| Choop---------- | 0-12 | Fine gravelly loamy coarse sand. | SM | A-1 | 0 | 70-95 | 50-75 | 25-50 | 10-25 | --- | NP |
| | 12 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Rock outcrop. | | | | | | | | | | | |
| 127, 128--------- | 0-5 | Loam---------- | CL-ML, ML | A-4 | 0 | 90-100 | 85-95 | 65-85 | 50-65 | 25-35 | 5-10 |
| Crefork | 5-43 | Clay, gravelly clay. | CL, CH | A-7 | 0 | 65-95 | 60-90 | 55-85 | 50-80 | 40-60 | 20-35 |
| | 43-63 | Clay loam, gravelly clay loam. | CL, SC | A-6, A-7 | 0 | 65-95 | 60-90 | 55-85 | 45-70 | 35-45 | 15-25 |
| 129---------- | 0-5 | Clay loam-------- | CL | A-6 | 0 | 90-100 | 85-95 | 70-90 | 60-70 | 30-40 | 10-15 |
| Crefork | 5-43 | Clay, gravelly clay. | CL, CH | A-7 | 0 | 65-95 | 60-90 | 55-85 | 50-80 | 40-60 | 20-35 |
| | 43-63 | Clay loam, gravelly clay loam. | CL, SC | A-6, A-7 | 0 | 65-95 | 60-90 | 55-85 | 45-70 | 35-45 | 15-25 |
| 131: | | | | | | | | | | | |
| Crefork--------- | 0-5 | Loam---------- | CL-ML, ML | A-4 | 0 | 90-100 | 85-95 | 65-85 | 50-65 | 25-35 | 5-10 |
| | 5-43 | Clay, gravelly clay. | CL, CH | A-7 | 0 | 65-95 | 60-90 | 55-85 | 50-80 | 40-60 | 20-35 |
| | 43-63 | Clay loam, gravelly clay loam. | CL, SC | A-6, A-7 | 0 | 65-95 | 60-90 | 55-85 | 45-70 | 35-45 | 15-25 |
| Musserhill------ | 0-5 | Gravelly loam---- | SC-SM, SM, GM-GC, GM | A-4 | 0-10 | 60-80 | 55-75 | 50-70 | 35-50 | 25-35 | 5-10 |
| | 5-11 | Very gravelly clay loam, extremely gravelly clay loam. | GC, GM | A-2, A-6, A-7 | 5-20 | 40-55 | 35-50 | 30-45 | 25-40 | 35-45 | 10-20 |
| | 11-32 | Extremely cobbly clay loam. | GC | A-2 | 20-40 | 20-30 | 15-25 | 10-20 | 10-15 | 40-50 | 15-25 |
| | 32-36 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 132---------- | 0-3 | Gravelly loam---- | GM | A-4 | 0-5 | 60-70 | 55-65 | 45-55 | 40-50 | 25-35 | NP-10 |
| Dedrick | 3-15 | Extremely gravelly loam, very gravelly loam. | GM | A-1, A-2 | 5-25 | 25-50 | 20-45 | 15-40 | 10-30 | 25-35 | NP-10 |
| | 15-19 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 133: | | | | | | | | | | | |
| Dedrick--------- | 0-3 | Very gravelly loam. | GM | A-1, A-2 | 5-15 | 35-55 | 30-50 | 25-45 | 15-35 | 25-35 | NP-10 |
| | 3-15 | Extremely gravelly loam, very gravelly loam. | GM | A-1, A-2 | 5-25 | 25-50 | 20-45 | 15-40 | 10-30 | 25-35 | NP-10 |
| | 15-19 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Rock outcrop. | | | | | | | | | | | |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 134---------- Demogul | 0-4 | Gravelly loam---- | SC-SM, GM-GC | A-4 | 0-5 | 60-80 | 55-75 | 50-65 | 40-50 | 25-30 | 5-10 |
| | 4-34 | Gravelly clay loam, gravelly sandy clay loam. | GM, ML | A-6, A-7 | 0-5 | 60-80 | 55-75 | 50-70 | 35-55 | 35-50 | 10-20 |
| | 34-68 | Gravelly clay loam, very gravelly clay loam, very gravelly sandy clay loam. | GM | A-2, A-6, A-7 | 0-5 | 45-65 | 40-60 | 35-55 | 30-45 | 35-50 | 10-20 |
| 136: | | | | | | | | | | | |
| Dougcity-------- | 0-13 | Gravelly loam---- | SC-SM, SM, GM-GC, GM | A-4 | 0 | 65-80 | 60-75 | 50-65 | 35-50 | 25-35 | 5-10 |
| | 13-80 | Very gravelly clay loam, very gravelly loam. | GM | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 35-50 | 10-20 |
| Dedrick--------- | 0-3 | Very gravelly loam. | GM | A-1, A-2 | 5-15 | 35-55 | 30-50 | 25-45 | 15-35 | 25-35 | NP-10 |
| | 3-15 | Extremely gravelly loam, very gravelly loam. | GM | A-1, A-2 | 5-25 | 25-50 | 20-45 | 15-40 | 10-30 | 25-35 | NP-10 |
| | 15-19 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 137: | | | | | | | | | | | |
| Dougcity-------- | 0-13 | Gravelly loam---- | SC-SM, SM, GM-GC, GM | A-4 | 0 | 65-80 | 60-75 | 50-65 | 35-50 | 25-35 | 5-10 |
| | 13-80 | Very gravelly clay loam, very gravelly loam. | GM | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 35-50 | 10-20 |
| Demogul--------- | 0-4 | Gravelly loam---- | SC-SM, GM-GC | A-4 | 0-5 | 60-80 | 55-75 | 50-65 | 40-50 | 25-30 | 5-10 |
| | 4-34 | Gravelly clay loam, gravelly sandy clay loam. | GM, ML | A-6, A-7 | 0-5 | 60-80 | 55-75 | 50-70 | 35-55 | 35-50 | 10-20 |
| | 34-68 | Gravelly clay loam, very gravelly clay loam, very gravelly sandy clay loam. | GM | A-2, A-6, A-7 | 0-5 | 45-65 | 40-60 | 35-55 | 30-45 | 35-50 | 10-20 |
| 138, 139, 140---- Dubakella | 0-5 | Cobbly clay loam | GC, CL | A-6 | 10-30 | 70-90 | 65-85 | 60-75 | 45-55 | 30-40 | 10-15 |
| | 5-34 | Very gravelly clay loam, very cobbly clay loam. | GC, SC | A-7, A-2 | 10-35 | 50-75 | 35-60 | 30-55 | 25-50 | 40-55 | 20-30 |
| | 34 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 141---------- Dubakella | 0-5 | Stony loam------- | SC, SC-SM, CL, CL-ML | A-4, A-6 | 10-25 | 85-95 | 70-85 | 60-70 | 40-60 | 25-40 | 5-15 |
| | 5-34 | Very gravelly clay loam, very cobbly clay loam. | GC, SC | A-7, A-2 | 10-30 | 50-75 | 35-60 | 35-60 | 30-50 | 40-55 | 20-30 |
| | 34 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 142---------- Etsel | 0-4 | Very gravelly loam. | GM-GC | A-1, A-2 | 0-5 | 35-55 | 30-50 | 20-45 | 15-35 | 20-30 | 5-10 |
| | 4-14 | Very gravelly loam, very gravelly sandy loam. | GM-GC | A-1, A-2 | 0-5 | 35-55 | 30-50 | 20-45 | 15-35 | 20-30 | 5-10 |
| | 14 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 143: | | | | | | | | | | | |
| Etsel---------- | 0-4 | Very gravelly loam. | GM-GC | A-1, A-2 | 0-5 | 35-55 | 30-50 | 20-45 | 15-35 | 20-30 | 5-10 |
| | 4-14 | Very gravelly loam, very gravelly sandy loam. | GM-GC | A-1, A-2 | 0-5 | 35-55 | 30-50 | 20-45 | 15-35 | 20-30 | 5-10 |
| | 14 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bamtush--------- | 0-6 | Extremely gravelly loam. | GP-GM, GM, GM-GC | A-2, A-1 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | 5-10 |
| | 6-14 | Very gravelly loam. | GM-GC, GC | A-2, A-1 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 25-35 | 5-15 |
| | 14-67 | Very gravelly clay loam, very gravelly loam, very gravelly sandy clay loam. | GC | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 30-40 | 10-20 |
| 144: | | | | | | | | | | | |
| Etsel---------- | 0-6 | Very gravelly loam. | GM-GC | A-1, A-2 | 0-5 | 35-55 | 30-50 | 20-45 | 15-35 | 20-30 | 5-10 |
| | 6-17 | Very gravelly loam, very gravelly sandy loam. | GM-GC | A-1, A-2 | 0-5 | 35-55 | 30-50 | 20-45 | 15-35 | 20-30 | 5-10 |
| | 17 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Weitchpec------- | 0-10 | Gravelly loam---- | GM-GC, GM, SC-SM, SM | A-4 | 0-5 | 55-80 | 50-75 | 45-60 | 35-50 | 25-35 | 5-10 |
| | 10-29 | Very gravelly sandy loam, very gravelly sandy clay loam, very gravelly loam. | GM-GC | A-2 | 0-5 | 30-55 | 25-50 | 15-40 | 10-25 | 20-30 | 5-10 |
| | 29 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 145: | | | | | | | | | | | |
| Goulding-------- | 0-6 | Very gravelly loam. | GM-GC, GM | A-2, A-1 | 0-5 | 35-55 | 25-50 | 20-45 | 15-25 | 25-35 | 5-10 |
| | 6-13 | Very gravelly loam, very gravelly clay loam, extremely gravelly loam. | GM-GC, GC, GP-GC | A-2, A-1 | 5-10 | 35-55 | 20-50 | 15-45 | 10-35 | 25-40 | 5-15 |
| | 13 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Holkat Variant-- | 0-11 | Clay loam-------- | CL | A-6 | 0-5 | 90-95 | 85-90 | 75-85 | 60-70 | 30-40 | 10-15 |
| | 11-23 | Gravelly loam, gravelly clay loam. | SC-SM, SM, GM-GC, GM | A-4 | 0-5 | 55-80 | 50-75 | 45-65 | 35-50 | 25-35 | 5-10 |
| | 23 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Marpa Variant--- | 0-10 | Gravelly clay loam. | GC, CL | A-6 | 0-10 | 60-80 | 55-75 | 50-70 | 40-55 | 30-40 | 10-20 |
| | 10-19 | Very cobbly clay loam, very gravelly clay loam. | GC | A-2, A-6 | 25-40 | 40-55 | 35-50 | 30-45 | 25-40 | 30-40 | 10-20 |
| | 19-36 | Very cobbly clay, very gravelly clay. | GC | A-2, A-7 | 25-40 | 40-55 | 35-50 | 30-45 | 25-40 | 40-50 | 15-25 |
| | 36-40 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 146: | | | | | | | | | | | |
| Goulding-------- | 0-6 | Very gravelly loam. | GM-GC, GM | A-2, A-1 | 0-5 | 35-55 | 25-50 | 20-45 | 15-25 | 25-35 | 5-10 |
| | 6-13 | Very gravelly loam, very gravelly clay loam, extremely gravelly loam. | GM-GC, GC, GP-GC | A-2, A-1 | 5-10 | 35-55 | 20-50 | 15-45 | 10-35 | 25-40 | 5-15 |
| | 13 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Vitzthum-------- | 0-3 | Extremely gravelly loam. | GM, GP-GM | A-1, A-2 | 0 | 20-30 | 15-25 | 10-20 | 10-15 | 25-35 | NP-10 |
| | 3-17 | Extremely gravelly sandy clay loam, extremely gravelly clay loam, very gravelly loam. | GP-GC, GM-GC, GC | A-2 | 0-10 | 20-45 | 15-35 | 10-30 | 5-15 | 25-35 | 5-15 |
| | 17-21 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 146: | | | | | | | | | | | |
| Vanvor---------- | 0-6 | Very gravelly sandy clay loam. | GM-GC, GM | A-2, A-1 | 0-5 | 35-55 | 30-50 | 25-45 | 15-25 | 25-35 | 5-10 |
| | 6-24 | Very gravelly sandy clay loam, very gravelly clay loam, very gravelly loam. | GM-GC, GC | A-2, A-1 | 0-10 | 30-50 | 25-45 | 20-40 | 15-35 | 25-40 | 5-15 |
| | 24-31 | Extremely gravelly clay loam, extremely gravelly sandy clay loam. | GP-GC, GM-GC, GC | A-2, A-1 | 0-25 | 25-30 | 20-25 | 15-20 | 5-15 | 25-40 | 5-15 |
| | 31-35 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 147, 148--------- Haploxerolls | 0-10 | Gravelly coarse sandy loam. | SM | A-1 | 10-15 | 60-80 | 50-75 | 30-45 | 15-25 | 15-25 | NP-5 |
| | 10-60 | Gravelly coarse sandy loam, loamy fine sand, fine sandy loam. | SM, SC-SM | A-1, A-2 | 10-15 | 60-95 | 50-90 | 25-60 | 10-30 | 15-30 | NP-10 |
| 149---------- Haysum | 0-15 | Loam---------- | CL-ML, CL | A-4 | 0 | 90-100 | 85-100 | 75-85 | 50-65 | 25-35 | 5-10 |
| | 15-60 | Gravelly clay loam, gravelly loam, clay loam. | GC, CL | A-6 | 0-10 | 55-85 | 50-80 | 45-75 | 35-65 | 30-40 | 10-20 |
| 150, 151--------- Haysum | 0-15 | Gravelly loam---- | SC-SM, SM, GM-GC, GM | A-4 | 0 | 55-80 | 50-75 | 45-60 | 35-50 | 25-35 | 5-10 |
| | 15-66 | Gravelly clay loam, gravelly loam, clay loam. | GC, CL | A-6 | 0-10 | 55-85 | 50-80 | 45-75 | 35-65 | 30-40 | 10-20 |
| | 66-71 | Very gravelly sandy clay loam, very gravelly clay loam. | GC, GP-GC | A-2 | 0-10 | 25-55 | 20-50 | 15-45 | 10-35 | 30-40 | 10-20 |
| 152---------- Haysum | 0-15 | Gravelly loam---- | SC-SM, SM, GM-GC, GM | A-4 | 0 | 55-80 | 50-75 | 45-60 | 35-50 | 25-35 | 5-10 |
| | 15-60 | Gravelly clay loam, gravelly loam, clay loam. | GC, CL | A-6 | 0-10 | 55-85 | 50-80 | 45-75 | 35-65 | 30-40 | 10-20 |
| 153, 154: | | | | | | | | | | | |
| Holkat---------- | 0-3 | Loam---------- | ML | A-4 | 0 | 85-95 | 80-90 | 65-85 | 50-70 | 25-35 | NP-10 |
| | 3-10 | Gravelly loam, loam. | ML, CL-ML, GM, GM-GC | A-4 | 0 | 65-85 | 60-80 | 55-75 | 35-60 | 25-35 | 5-10 |
| | 10-35 | Gravelly loam---- | GM, GM-GC, SM, SC-SM | A-4 | 0 | 65-80 | 60-75 | 55-60 | 35-50 | 25-35 | 5-10 |
| | 35 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 153, 154: | | | | | | | | | | | |
| Hoosimbim------- | 0-4 | Gravelly loam---- | GM-GC, GM, SC-SM, SM | A-4 | 0-5 | 65-80 | 50-75 | 45-70 | 35-50 | 25-35 | 5-10 |
| | 4-16 | Very gravelly sandy clay loam, very gravelly clay loam. | GC | A-2 | 0-10 | 30-50 | 25-45 | 20-40 | 10-35 | 30-40 | 10-20 |
| | 16-42 | Extremely gravelly sandy clay loam. | GP-GC, GC | A-2 | 5-10 | 15-30 | 10-25 | 5-20 | 5-15 | 30-40 | 10-20 |
| | 42-46 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 155: | | | | | | | | | | | |
| Holkat Variant-- | 0-5 | Gravelly loam---- | SC-SM, SM, GM-GC, GM | A-4 | 0-5 | 55-80 | 50-75 | 45-65 | 35-50 | 25-35 | 5-10 |
| | 5-35 | Gravelly loam, gravelly clay loam. | SC-SM, SM, GM-GC, GM | A-4 | 0-5 | 55-80 | 50-75 | 45-65 | 35-50 | 25-35 | 5-10 |
| | 35-38 | Very gravelly loam, very gravelly clay loam. | GM-GC, GM | A-2 | 0-15 | 40-55 | 35-50 | 30-45 | 25-35 | 25-35 | 5-10 |
| | 38-42 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dedrick--------- | 0-3 | Very gravelly loam. | GM | A-1, A-2 | 5-15 | 35-55 | 30-50 | 25-45 | 15-35 | 25-35 | NP-10 |
| | 3-15 | Extremely gravelly loam, very gravelly loam. | GM | A-1, A-2 | 5-25 | 25-50 | 20-45 | 15-40 | 10-30 | 25-35 | NP-10 |
| | 15-19 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 156---------- Hoosimbim | 0-5 | Gravelly loam---- | SC-SM, SM, GM-GC, GM | A-4 | 0-5 | 60-80 | 55-75 | 45-65 | 35-50 | 25-35 | 5-10 |
| | 5-13 | Gravelly loam---- | SC-SM, SM, GM-GC, GM | A-4 | 0-5 | 60-80 | 55-75 | 45-65 | 35-50 | 25-35 | 5-10 |
| | 13-42 | Very gravelly clay loam. | GC | A-2, A-6, A-7 | 0-10 | 35-55 | 30-50 | 25-50 | 20-40 | 30-50 | 10-25 |
| | 42-46 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 157: | | | | | | | | | | | |
| Hoosimbim------- | 0-4 | Extremely gravelly sandy loam. | GP-GM | A-1 | 0-5 | 20-30 | 15-25 | 10-15 | 5-10 | 20-30 | NP-5 |
| | 4-16 | Very gravelly sandy clay loam, very gravelly clay loam. | GC | A-2 | 0-10 | 30-50 | 25-45 | 20-40 | 10-35 | 30-40 | 10-20 |
| | 16-42 | Extremely gravelly sandy clay loam. | GP-GC, GC | A-2 | 5-10 | 15-30 | 10-25 | 5-20 | 5-15 | 30-40 | 10-20 |
| | 42-46 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 157: | | | | | | | | | | | |
| Bamtush--------- | 0-6 | Extremely gravelly loam. | GP-GM, GM, GM-GC | A-2, A-1 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | 5-10 |
| | 6-14 | Very gravelly loam. | GM-GC, GC | A-2, A-1 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 25-35 | 5-15 |
| | 14-67 | Very gravelly clay loam, very gravelly loam, very gravelly sandy clay loam. | GC | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 30-40 | 10-20 |
| Marpa----------- | 0-3 | Very gravelly sandy clay loam. | GM-GC, GM | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 10-25 | 25-35 | 5-10 |
| | 3-31 | Very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam. | GC | A-2, A-6 | 5-10 | 30-55 | 25-50 | 20-45 | 10-40 | 30-40 | 10-15 |
| | 31 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 158: | | | | | | | | | | | |
| Hoosimbim------- | 0-4 | Extremely gravelly sandy loam. | GP-GM | A-1 | 0-5 | 20-30 | 15-25 | 10-15 | 5-10 | 20-30 | NP-5 |
| | 4-16 | Very gravelly sandy clay loam, very gravelly clay loam. | GC | A-2 | 0-10 | 30-50 | 25-45 | 20-40 | 10-35 | 30-40 | 10-20 |
| | 16-42 | Extremely gravelly sandy clay loam. | GP-GC, GC | A-2 | 5-10 | 15-30 | 10-25 | 5-20 | 5-15 | 30-40 | 10-20 |
| | 42-46 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Etsel----------- | 0-4 | Very gravelly loam. | GM-GC | A-1, A-2 | 0-5 | 35-55 | 30-50 | 20-45 | 15-35 | 20-30 | 5-10 |
| | 4-14 | Very gravelly loam, very gravelly sandy loam. | GM-GC | A-1, A-2 | 0-5 | 35-55 | 30-50 | 20-45 | 15-35 | 20-30 | 5-10 |
| | 14 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 159: | | | | | | | | | | | |
| Hoosimbim------- | 0-4 | Extremely gravelly sandy loam. | GP-GM | A-1 | 0-5 | 20-30 | 15-25 | 10-15 | 5-10 | 20-30 | NP-5 |
| | 4-16 | Very gravelly sandy clay loam, very gravelly clay loam. | GC | A-2 | 0-10 | 30-50 | 25-45 | 20-40 | 10-35 | 30-40 | 10-20 |
| | 16-42 | Extremely gravelly sandy clay loam. | GP-GC, GC | A-2 | 5-10 | 15-30 | 10-25 | 5-20 | 5-15 | 30-40 | 10-20 |
| | 42-46 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 159: | | | | | | | | | | | |
| Goulding-------- | 0-6 | Very gravelly loam. | GM-GC, GM | A-2, A-1 | 0-5 | 35-55 | 25-50 | 20-45 | 15-25 | 25-35 | 5-10 |
| | 6-13 | Very gravelly loam, very gravelly clay loam, extremely gravelly loam. | GM-GC, GC, GP-GC | A-2, A-1 | 5-10 | 35-55 | 20-50 | 15-45 | 10-35 | 25-40 | 5-15 |
| | 13 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 160, 161--------- Hotaw | 0-6 | Loam---------- | ML | A-4 | 0 | 90-100 | 85-100 | 65-85 | 50-60 | 25-35 | NP-10 |
| | 6-37 | Sandy clay loam, clay loam. | SC, CL | A-6 | 0-5 | 90-100 | 85-100 | 70-90 | 35-60 | 25-40 | 10-20 |
| | 37 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 162: | | | | | | | | | | | |
| Indleton-------- | 0-11 | Extremely gravelly sandy loam. | GM | A-1 | 0-5 | 25-30 | 20-25 | 15-20 | 10-15 | 20-30 | NP-5 |
| | 11-22 | Extremely gravelly sandy loam, extremely gravelly loam. | GM | A-1 | 0-15 | 25-30 | 20-25 | 15-20 | 10-15 | 20-30 | NP-5 |
| | 22-60 | Extremely gravelly sandy clay loam, very gravelly loam, extremely gravelly sandy loam. | GM | A-1, A-2 | 5-15 | 25-45 | 20-40 | 15-35 | 10-30 | 25-35 | NP-10 |
| Caris----------- | 0-3 | Extremely gravelly sandy loam. | GP-GM, GP-GC | A-1, A-2 | 0-5 | 20-30 | 15-25 | 15-20 | 5-10 | 20-30 | NP-10 |
| | 3-33 | Very gravelly loam, extremely gravelly sandy loam, extremely gravelly loam. | GM-GC, GP-GC | A-2, A-1 | 0-5 | 20-45 | 15-40 | 10-35 | 5-25 | 25-30 | 5-10 |
| | 33 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hoosimbim------- | 0-4 | Extremely gravelly sandy loam. | GP-GM | A-1 | 0-5 | 20-30 | 15-25 | 10-15 | 5-10 | 20-30 | NP-5 |
| | 4-16 | Very gravelly sandy clay loam, very gravelly clay loam. | GC | A-2 | 0-10 | 30-50 | 25-45 | 20-40 | 10-35 | 30-40 | 10-20 |
| | 16-42 | Extremely gravelly sandy clay loam. | GP-GC, GC | A-2 | 5-10 | 15-30 | 10-25 | 5-20 | 5-15 | 30-40 | 10-20 |
| | 42-46 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 163, 164--------- Jafa | 0-14 | Loam---------- | CL-ML, ML | A-4 | 0 | 80-100 | 75-95 | 65-85 | 50-65 | 25-35 | 5-10 |
| | 14-67 | Gravelly clay loam, gravelly sandy clay loam, clay loam. | CL, GC, SC | A-6 | 0-15 | 60-90 | 55-85 | 50-80 | 35-65 | 30-40 | 10-20 |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 165, 166--------- | 0-18 | Gravelly loam---- | GM, SM | A-4 | 0-5 | 60-80 | 55-75 | 45-70 | 35-50 | 25-35 | NP-10 |
| Jafa | 18-74 | Gravelly clay loam, gravelly sandy clay loam. | GC, SC | A-2 | 0-5 | 55-70 | 50-65 | 30-50 | 20-35 | 30-40 | 10-20 |
| 167---------- | 0-10 | Gravelly loam---- | SC-SM, SM | A-2 | 0 | 65-80 | 60-75 | 35-50 | 25-35 | 25-35 | 5-10 |
| Jafa | 10-21 | Gravelly loam, gravelly clay loam. | SC, SM | A-4, A-6 | 0-5 | 65-80 | 60-75 | 55-65 | 35-50 | 30-40 | 5-15 |
| | 21-44 | Gravelly clay loam. | GC, SC | A-2 | 0-10 | 55-70 | 50-65 | 30-50 | 20-35 | 30-40 | 10-20 |
| | 44-60 | Clay---------- | CL, CH | A-7 | 0 | 85-95 | 80-90 | 70-85 | 60-70 | 40-55 | 20-30 |
| 170: | | | | | | | | | | | |
| Marpa---------- | 0-3 | Very gravelly sandy clay loam. | GM-GC, GM | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 10-25 | 25-35 | 5-10 |
| | 3-31 | Very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam. | GC | A-2, A-6 | 5-10 | 30-55 | 25-50 | 20-45 | 10-40 | 30-40 | 10-15 |
| | 31 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hoosimbim------- | 0-4 | Extremely gravelly sandy loam. | GP-GM | A-1 | 0-5 | 20-30 | 15-25 | 10-15 | 5-10 | 20-30 | NP-5 |
| | 4-16 | Very gravelly sandy clay loam, very gravelly clay loam. | GC | A-2 | 0-10 | 30-50 | 25-45 | 20-40 | 10-35 | 30-40 | 10-20 |
| | 16-42 | Extremely gravelly sandy clay loam. | GP-GC, GC | A-2 | 5-10 | 15-30 | 10-25 | 5-20 | 5-15 | 30-40 | 10-20 |
| | 42-46 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 171: | | | | | | | | | | | |
| Marpa---------- | 0-3 | Very gravelly sandy clay loam. | GM-GC, GM | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 10-25 | 25-35 | 5-10 |
| | 3-31 | Very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam. | GC | A-2, A-6 | 5-10 | 30-55 | 25-50 | 20-45 | 10-40 | 30-40 | 10-15 |
| | 31 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 171: | | | | | | | | | | | |
| Hoosimbim------- | 0-4 | Extremely gravelly sandy loam. | GP-GM | A-1 | 0-5 | 20-30 | 15-25 | 10-15 | 5-10 | 20-30 | NP-5 |
| | 4-16 | Very gravelly sandy clay loam, very gravelly clay loam. | GC | A-2 | 0-10 | 30-50 | 25-45 | 20-40 | 10-35 | 30-40 | 10-20 |
| | 16-42 | Extremely gravelly sandy clay loam. | GP-GC, GC | A-2 | 5-10 | 15-30 | 10-25 | 5-20 | 5-15 | 30-40 | 10-20 |
| | 42-46 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bamtush--------- | 0-6 | Extremely gravelly loam. | GP-GM, GM, GM-GC | A-2, A-1 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | 5-10 |
| | 6-14 | Very gravelly loam. | GM-GC, GC | A-2, A-1 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 25-35 | 5-15 |
| | 14-67 | Very gravelly clay loam, very gravelly loam, very gravelly sandy clay loam. | GC | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 15-35 | 30-40 | 10-20 |
| 172: | | | | | | | | | | | |
| Marpa---------- | 0-3 | Very gravelly sandy clay loam. | GM-GC, GM | A-2 | 0-5 | 30-55 | 25-50 | 20-45 | 10-25 | 25-35 | 5-10 |
| | 3-31 | Very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam. | GC | A-2, A-6 | 5-10 | 30-55 | 25-50 | 20-45 | 10-40 | 30-40 | 10-15 |
| | 31 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Vitzthum-------- | 0-3 | Extremely gravelly loam. | GM, GP-GM | A-1, A-2 | 0 | 20-30 | 15-25 | 10-20 | 10-15 | 25-35 | NP-10 |
| | 3-17 | Extremely gravelly sandy clay loam, extremely gravelly clay loam, very gravelly loam. | GP-GC, GM-GC, GC | A-2 | 0-10 | 20-45 | 15-35 | 10-30 | 5-15 | 25-35 | 5-15 |
| | 17-21 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 173: | | | | | | | | | | | |
| Marpa Variant--- | 0-10 | Gravelly clay loam. | GC, CL | A-6 | 0-10 | 60-80 | 55-75 | 50-70 | 40-55 | 30-40 | 10-20 |
| | 10-19 | Very cobbly clay loam, very gravelly clay loam. | GC | A-2, A-6 | 25-40 | 40-55 | 35-50 | 30-45 | 25-40 | 30-40 | 10-20 |
| | 19-36 | Very cobbly clay, very gravelly clay. | GC | A-2, A-7 | 25-40 | 40-55 | 35-50 | 30-45 | 25-40 | 40-50 | 15-25 |
| | 36-40 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 173: | | | | | | | | | | | |
| Goulding-------- | 0-6 | Very gravelly loam. | GM-GC, GM | A-2, A-1 | 0-5 | 35-55 | 25-50 | 20-45 | 15-25 | 25-35 | 5-10 |
| | 6-13 | Very gravelly loam, very gravelly clay loam, extremely gravelly loam. | GM-GC, GC, GP-GC | A-2, A-1 | 5-10 | 35-55 | 20-50 | 15-45 | 10-35 | 25-40 | 5-15 |
| | 13 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Holkat Variant-- | 0-11 | Clay loam-------- | CL | A-6 | 0-5 | 90-95 | 85-90 | 75-85 | 60-70 | 30-40 | 10-15 |
| | 11-23 | Gravelly loam, gravelly clay loam. | SC-SM, SM, GM-GC, GM | A-4 | 0-5 | 55-80 | 50-75 | 45-65 | 35-50 | 25-35 | 5-10 |
| | 23 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 175---------- | 0-11 | Loam---------- | ML, CL-ML | A-4 | 0 | 80-100 | 75-100 | 70-95 | 50-75 | 25-35 | 5-10 |
| Millsholm | 11 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 176: | | | | | | | | | | | |
| Millsholm------- | 0-11 | Loam---------- | ML, CL-ML | A-4 | 0 | 80-100 | 75-100 | 70-95 | 50-75 | 25-35 | 5-10 |
| | 11 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Azule----------- | 0-4 | Silty clay loam | CL | A-6 | 0 | 80-100 | 75-100 | 70-100 | 60-85 | 30-40 | 10-20 |
| | 4-36 | Clay, sandy clay | CL, CH | A-7 | 0 | 80-100 | 75-100 | 65-100 | 50-90 | 45-65 | 20-35 |
| | 36 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 177---------- | 0-5 | Sandy loam------- | SM | A-2 | 0 | 90-100 | 75-95 | 45-60 | 25-35 | --- | NP-5 |
| Minersville | 5-30 | Sandy loam, fine gravelly sandy loam, fine gravelly coarse sandy loam. | SM | A-1, A-2 | 0 | 90-100 | 70-85 | 35-50 | 20-30 | --- | NP-5 |
| | 30-43 | Very gravelly coarse sandy loam, fine gravelly coarse sandy loam. | SM | A-1 | 0 | 75-85 | 30-60 | 15-40 | 10-25 | --- | NP |
| | 43-47 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 178: | | | | | | | | | | | |
| Minersville Variant-------- | 0-9 | Fine gravelly loamy coarse sand. | SM, SP-SM | A-1 | 0 | 80-100 | 50-80 | 25-50 | 5-20 | --- | NP |
| | 9-34 | Very gravelly loamy coarse sand. | SP-SM, SM | A-1 | 0 | 60-80 | 35-50 | 15-30 | 5-15 | --- | NP |
| | 34-38 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Choop----------- | 0-12 | Fine gravelly loamy coarse sand. | SM | A-1 | 0 | 70-95 | 50-75 | 25-50 | 10-25 | --- | NP |
| | 12 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 179, 180---------<br>Musserhill | 0-5 | Gravelly loam---- | SC-SM, SM, GM-GC, GM | A-4 | 0-10 | 60-80 | 55-75 | 50-70 | 35-50 | 25-35 | 5-10 |
| | 5-11 | Very gravelly clay loam, extremely gravelly clay loam. | GC, GM | A-2, A-6, A-7 | 5-20 | 40-55 | 35-50 | 30-45 | 25-40 | 35-45 | 10-20 |
| | 11-32 | Extremely cobbly clay loam. | GC | A-2 | 20-40 | 20-30 | 15-25 | 10-20 | 10-15 | 40-50 | 15-25 |
| | 32-36 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 181:<br>Musserhill------ | 0-5 | Gravelly loam---- | SC-SM, SM, GM-GC, GM | A-4 | 0-10 | 60-80 | 55-75 | 50-70 | 35-50 | 25-35 | 5-10 |
| | 5-11 | Very gravelly clay loam, extremely gravelly clay loam. | GC, GM | A-2, A-6, A-7 | 5-20 | 40-55 | 35-50 | 30-45 | 25-40 | 35-45 | 10-20 |
| | 11-32 | Extremely cobbly clay loam. | GC | A-2 | 20-40 | 20-30 | 15-25 | 10-20 | 10-15 | 40-50 | 15-25 |
| | 32-36 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Weaverville----- | 0-4 | Clay loam-------- | CL | A-6 | 0 | 85-95 | 80-90 | 75-85 | 55-70 | 30-40 | 10-15 |
| | 4-56 | Gravelly clay loam, clay loam, gravelly loam. | ML, MH, GM | A-7, A-6 | 0-10 | 70-90 | 65-85 | 60-80 | 40-55 | 35-55 | 10-20 |
| | 56-81 | Very gravelly clay loam, gravelly clay loam, cobbly clay loam. | ML, MH, GM | A-6, A-7 | 5-25 | 60-80 | 55-75 | 50-70 | 40-55 | 35-55 | 10-20 |
| 182:<br>Musserhill------ | 0-5 | Gravelly loam---- | SC-SM, SM, GM-GC, GM | A-4 | 0-10 | 60-80 | 55-75 | 50-70 | 35-50 | 25-35 | 5-10 |
| | 5-11 | Very gravelly clay loam, extremely gravelly clay loam. | GC, GM | A-2, A-6, A-7 | 5-20 | 40-55 | 35-50 | 30-45 | 25-40 | 35-45 | 10-20 |
| | 11-32 | Extremely cobbly clay loam. | GC | A-2 | 20-40 | 20-30 | 15-25 | 10-20 | 10-15 | 40-50 | 15-25 |
| | 32-36 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Weaverville----- | 0-4 | Loam------------- | CL-ML, ML | A-4 | 0-5 | 85-95 | 80-90 | 70-85 | 50-60 | 25-35 | 5-10 |
| | 4-56 | Gravelly clay loam, clay loam, gravelly loam. | ML, MH, GM | A-7, A-6 | 0-10 | 70-90 | 65-85 | 60-80 | 40-55 | 35-55 | 10-20 |
| | 56-81 | Very gravelly clay loam, gravelly clay loam, cobbly clay loam. | ML, MH, GM | A-6, A-7 | 5-25 | 60-80 | 55-75 | 50-70 | 40-55 | 35-55 | 10-20 |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 183: | | | | | | | | | | | |
| Musserhill------ | 0-5 | Gravelly loam---- | SC-SM, SM, GM-GC, GM | A-4 | 0-10 | 60-80 | 55-75 | 50-70 | 35-50 | 25-35 | 5-10 |
| | 5-11 | Very gravelly clay loam, extremely gravelly clay loam. | GC, GM | A-2, A-6, A-7 | 5-20 | 40-55 | 35-50 | 30-45 | 25-40 | 35-45 | 10-20 |
| | 11-32 | Extremely cobbly clay loam. | GC | A-2 | 20-40 | 20-30 | 15-25 | 10-20 | 10-15 | 40-50 | 15-25 |
| | 32-36 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Weaverville----- | 0-4 | Clay loam-------- | CL | A-6 | 0 | 85-95 | 80-90 | 75-85 | 55-70 | 30-40 | 10-15 |
| | 4-56 | Gravelly clay loam, clay loam, gravelly loam. | ML, MH, GM | A-7, A-6 | 0-10 | 70-90 | 65-85 | 60-80 | 40-55 | 35-55 | 10-20 |
| | 56-81 | Very gravelly clay loam, gravelly clay loam, cobbly clay loam. | ML, MH, GM | A-6, A-7 | 5-25 | 60-80 | 55-75 | 50-70 | 40-55 | 35-55 | 10-20 |
| Urban land. | | | | | | | | | | | |
| 184---------- | 0-4 | Loam---------- | CL-ML, ML | A-4 | 0-10 | 85-95 | 80-90 | 75-80 | 50-65 | 25-35 | 5-10 |
| Musserhill Variant | 4-13 | Gravelly clay loam. | CL | A-6 | 0-10 | 70-80 | 65-75 | 55-65 | 50-60 | 30-40 | 10-20 |
| | 13-32 | Very gravelly clay, very gravelly clay loam, extremely gravelly clay. | GC | A-2, A-7 | 0-20 | 40-55 | 35-50 | 30-45 | 30-40 | 40-55 | 20-30 |
| | 32-36 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 185: | | | | | | | | | | | |
| Pardaloe-------- | 0-15 | Gravelly loam---- | SM, SC-SM, GM, GM-GC | A-1, A-2 | 0-10 | 55-80 | 50-75 | 35-60 | 20-35 | 20-30 | NP-10 |
| | 15-60 | Very gravelly loam, very gravelly sandy clay loam, extremely gravelly sandy clay loam. | GM, GM-GC, GP-GM, GC | A-1, A-2 | 0-30 | 20-55 | 15-50 | 10-45 | 5-35 | 25-35 | 5-10 |
| Dedrick--------- | 0-3 | Very gravelly loam. | GM | A-1, A-2 | 5-15 | 35-55 | 30-50 | 25-45 | 15-35 | 25-35 | NP-10 |
| | 3-15 | Extremely gravelly loam, very gravelly loam. | GM | A-1, A-2 | 5-25 | 25-50 | 20-45 | 15-40 | 10-30 | 25-35 | NP-10 |
| | 15-19 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 186: | | | | | | | | | | | |
| Pardaloe-------- | 0-6 | Very gravelly loam. | GM, GM-GC, GC | A-1, A-2 | 0-10 | 40-55 | 35-50 | 20-45 | 15-35 | 20-30 | NP-10 |
| | 6-60 | Very gravelly loam, very gravelly sandy clay loam, extremely gravelly sandy clay loam. | GM, GM-GC, GP-GM, GC | A-1, A-2 | 0-30 | 20-55 | 15-50 | 10-45 | 5-35 | 25-35 | 5-10 |
| Goulding-------- | 0-6 | Very gravelly loam. | GM-GC, GM | A-2, A-1 | 0-5 | 35-55 | 25-50 | 20-45 | 15-25 | 25-35 | 5-10 |
| | 6-13 | Very gravelly loam, very gravelly clay loam, extremely gravelly loam. | GM-GC, GC, GP-GC | A-2, A-1 | 5-10 | 35-55 | 20-50 | 15-45 | 10-35 | 25-40 | 5-15 |
| | 13 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 188--------------- Rock outcrop | 0-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 189: | | | | | | | | | | | |
| Rock outcrop---- | 0-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dedrick--------- | 0-3 | Very gravelly loam. | GM | A-1, A-2 | 5-15 | 35-55 | 30-50 | 25-45 | 15-35 | 25-35 | NP-10 |
| | 3-15 | Extremely gravelly loam, very gravelly loam. | GM | A-1, A-2 | 5-25 | 25-50 | 20-45 | 15-40 | 10-30 | 25-35 | NP-10 |
| | 15-19 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 190--------------- Sheetiron | 0-4 | Extremely gravelly loam. | GM | A-1, A-2 | 5-10 | 25-30 | 20-25 | 15-20 | 10-15 | 25-40 | NP-10 |
| | 4-19 | Very gravelly sandy loam, very gravelly loam. | GM | A-1, A-2 | 5-20 | 30-50 | 25-50 | 20-45 | 15-35 | 25-40 | NP-10 |
| | 19-24 | Extremely gravelly loam, extremely gravelly sandy loam. | GM | A-1, A-2 | 5-20 | 25-30 | 20-25 | 15-20 | 10-15 | 25-40 | NP-10 |
| | 24 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 191: | | | | | | | | | | | |
| Sheetiron------- | 0-4 | Very gravelly loam. | GM | A-2 | 5-10 | 40-55 | 35-50 | 30-45 | 25-35 | 25-40 | NP-10 |
| | 4-19 | Very gravelly sandy loam, very gravelly loam. | GM | A-1, A-2 | 5-20 | 30-50 | 25-50 | 20-45 | 15-35 | 25-40 | NP-10 |
| | 19-24 | Extremely gravelly loam, extremely gravelly sandy loam. | GM | A-1, A-2 | 5-20 | 25-30 | 20-25 | 15-20 | 10-15 | 25-40 | NP-10 |
| | 24 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 191: | | | | | | | | | | | |
| Barpeak--------- | 0-3 | Very gravelly loam. | GM-GC, GM | A-2 | 0-5 | 35-55 | 30-50 | 25-40 | 20-35 | 25-35 | 5-10 |
| | 3-8 | Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam. | GM-GC, GM | A-2 | 0-5 | 25-50 | 20-45 | 15-30 | 10-20 | 25-35 | 5-10 |
| | 8-61 | Extremely gravelly sandy clay loam, extremely gravelly loam, extremely gravelly sandy loam. | GP-GM | A-2 | 10-25 | 15-30 | 10-25 | 5-15 | 5-10 | 25-35 | 5-10 |
| 192: | | | | | | | | | | | |
| Sheetiron Variant-------- | 0-2 | Gravelly loam---- | SM, GM | A-4 | 0-10 | 60-80 | 55-75 | 50-65 | 35-50 | 25-40 | NP-10 |
| | 2-18 | Gravelly clay loam. | CL, ML, GM, GC | A-6, A-7 | 0-10 | 60-80 | 55-75 | 50-70 | 45-55 | 30-50 | 10-20 |
| | 18-31 | Very gravelly clay loam. | GM, GC | A-2 | 0-10 | 40-55 | 35-50 | 30-45 | 25-35 | 30-50 | 10-20 |
| | 31-35 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dedrick--------- | 0-3 | Very gravelly loam. | GM | A-1, A-2 | 5-15 | 35-55 | 30-50 | 25-45 | 15-35 | 25-35 | NP-10 |
| | 3-15 | Extremely gravelly loam, very gravelly loam. | GM | A-1, A-2 | 5-25 | 25-50 | 20-45 | 15-40 | 10-30 | 25-35 | NP-10 |
| | 15-19 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 193---------- Skyrock | 0-4 | Extremely gravelly loam. | GM, GP-GM | A-1, A-2 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | NP-10 |
| | 4-10 | Very gravelly loam. | GM | A-1, A-2 | 0-5 | 35-50 | 30-45 | 25-40 | 20-30 | 25-35 | NP-10 |
| | 10-18 | Extremely gravelly sandy clay loam, extremely gravelly loam. | GM, GP-GM | A-1, A-2 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | NP-10 |
| | 18-22 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 194: | | | | | | | | | | | |
| Skyrock--------- | 0-4 | Extremely gravelly loam. | GM, GP-GM | A-1, A-2 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | NP-10 |
| | 4-18 | Extremely gravelly sandy clay loam, extremely gravelly loam. | GM, GP-GM | A-1, A-2 | 0-5 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | NP-10 |
| | 18 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Rock outcrop. | | | | | | | | | | | |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 195: | | | | | | | | | | | |
| Skyrock Variant- | 0-3 | Very stony loam | SC-SM, SM, GM-GC, GM | A-4 | 15-30 | 55-75 | 50-70 | 45-60 | 35-50 | 25-35 | 5-10 |
| | 3-13 | Extremely cobbly loam, extremely cobbly clay loam. | CL | A-6 | 45-65 | 75-85 | 70-80 | 60-70 | 50-60 | 30-40 | 10-15 |
| | 13-17 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Rock outcrop---- | 0-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 196: | | | | | | | | | | | |
| Skyrock Variant- | 0-3 | Very stony loam | SC-SM, SM, GM-GC, GM | A-4 | 15-30 | 55-75 | 50-70 | 45-60 | 35-50 | 25-35 | 5-10 |
| | 3-13 | Extremely cobbly loam, extremely cobbly clay loam. | CL | A-6 | 45-65 | 75-85 | 70-80 | 60-70 | 50-60 | 30-40 | 10-15 |
| | 13-17 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Rock outcrop. | | | | | | | | | | | |
| Rubble land. | | | | | | | | | | | |
| 197: | | | | | | | | | | | |
| Springgulch----- | 0-7 | Gravelly clay loam. | SC, CL, GC | A-6 | 0 | 60-80 | 55-75 | 50-70 | 40-55 | 30-35 | 10-15 |
| | 7-50 | Gravelly clay loam, clay loam, gravelly clay. | ML, MH | A-7 | 0-5 | 65-85 | 60-80 | 55-75 | 50-60 | 40-60 | 10-25 |
| | 50-75 | Very gravelly clay loam, very gravelly clay. | GM | A-2, A-7 | 0-10 | 40-55 | 35-50 | 30-45 | 25-40 | 40-60 | 10-25 |
| Brockgulch Variant-------- | 0-2 | Loam---------- | CL-ML, ML | A-4 | 0-5 | 80-90 | 75-85 | 65-75 | 50-60 | 25-35 | 5-10 |
| | 2-5 | Gravelly clay loam. | ML, GM | A-6, A-7 | 0-5 | 60-80 | 55-75 | 50-70 | 40-60 | 35-50 | 10-20 |
| | 5-31 | Very gravelly loam, very gravelly clay loam. | GM-GC, GM | A-2 | 0-5 | 35-50 | 30-45 | 25-35 | 20-30 | 25-40 | 5-15 |
| | 31-35 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 198, 199: | | | | | | | | | | | |
| Tallowbox------- | 0-9 | Gravelly coarse sandy loam. | SM | A-2, A-1 | 0 | 85-100 | 60-75 | 35-55 | 15-30 | --- | NP |
| | 9-23 | Gravelly sandy loam, sandy loam, gravelly coarse sandy loam. | SM | A-2, A-1 | 0-15 | 75-100 | 60-85 | 35-65 | 15-35 | --- | NP |
| | 23 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 198, 199: | | | | | | | | | | | |
| Minersville----- | 0-5 | Sandy loam------- | SM | A-2 | 0 | 90-100 | 75-95 | 45-60 | 25-35 | --- | NP-5 |
| | 5-30 | Sandy loam, fine gravelly sandy loam, fine gravelly coarse sandy loam. | SM | A-1, A-2 | 0 | 90-100 | 70-85 | 35-50 | 20-30 | --- | NP-5 |
| | 30-43 | Very gravelly coarse sandy loam, fine gravelly coarse sandy loam. | SM | A-1 | 0 | 75-85 | 30-60 | 15-40 | 10-25 | --- | NP |
| | 43-47 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 201: | | | | | | | | | | | |
| Urban land. | | | | | | | | | | | |
| Xeralfs--------- | 0-1 | Very gravelly clay loam. | GC | A-2 | 0-10 | 40-60 | 35-50 | 30-50 | 25-35 | 30-40 | 10-15 |
| | 1-30 | Extremely gravelly clay loam, very gravelly clay loam, gravelly loam. | GC, SC, CL | A-2, A-4, A-6 | 5-15 | 30-80 | 25-75 | 20-70 | 15-70 | 20-40 | 5-15 |
| | 30-34 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 202: | | | | | | | | | | | |
| Valcreek-------- | 0-3 | Very gravelly loamy coarse sand. | SM | A-1 | 0 | 60-75 | 35-50 | 20-30 | 10-15 | --- | NP |
| | 3-16 | Fine gravelly loamy coarse sand. | SM | A-1 | 0 | 65-85 | 50-70 | 25-45 | 10-20 | --- | NP |
| | 16-31 | Very gravelly loamy coarse sand, extremely gravelly loamy coarse sand. | GP-GM, GM, SP-SM, SM | A-1 | 0 | 40-75 | 20-50 | 10-30 | 5-15 | --- | NP |
| | 31-35 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Choop----------- | 0-5 | Fine gravelly loamy coarse sand. | SM | A-1 | 0 | 70-95 | 50-75 | 25-50 | 10-25 | --- | NP |
| | 5-16 | Very gravelly loamy coarse sand, extremely gravelly loamy coarse sand. | GP-GM, GM, SP-SM, SM | A-1 | 0 | 40-75 | 20-50 | 10-30 | 5-15 | --- | NP |
| | 16-20 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 203: | | | | | | | | | | | |
| Valcreek-------- | 0-3 | Very gravelly loamy coarse sand. | SM | A-1 | 0 | 60-75 | 35-50 | 20-30 | 10-15 | --- | NP |
| | 3-16 | Fine gravelly loamy coarse sand. | SM | A-1 | 0 | 65-85 | 50-70 | 25-45 | 10-20 | --- | NP |
| | 16-31 | Very gravelly loamy coarse sand, extremely gravelly loamy coarse sand. | GP-GM, GM, SP-SM, SM | A-1 | 0 | 40-75 | 20-50 | 10-30 | 5-15 | --- | NP |
| | 31-35 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Minersville----- | 0-5 | Sandy loam------- | SM | A-2 | 0 | 90-100 | 75-95 | 45-60 | 25-35 | --- | NP-5 |
| | 5-30 | Sandy loam, fine gravelly sandy loam, fine gravelly coarse sandy loam. | SM | A-1, A-2 | 0 | 90-100 | 70-85 | 35-50 | 20-30 | --- | NP-5 |
| | 30-43 | Very gravelly coarse sandy loam, fine gravelly coarse sandy loam. | SM | A-1 | 0 | 75-85 | 30-60 | 15-40 | 10-25 | --- | NP |
| | 43-47 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 204: | | | | | | | | | | | |
| Valcreek-------- | 0-3 | Very gravelly loamy coarse sand. | SM | A-1 | 0 | 60-75 | 35-50 | 20-30 | 10-15 | --- | NP |
| | 3-16 | Fine gravelly loamy coarse sand. | SM | A-1 | 0 | 65-85 | 50-70 | 25-45 | 10-20 | --- | NP |
| | 16-31 | Very gravelly loamy coarse sand, extremely gravelly loamy coarse sand. | GP-GM, GM, SP-SM, SM | A-1 | 0 | 40-75 | 20-50 | 10-30 | 5-15 | --- | NP |
| | 31-35 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Minersville----- | 0-5 | Sandy loam------- | SM | A-2 | 0 | 90-100 | 75-95 | 45-60 | 25-35 | --- | NP-5 |
| | 5-30 | Sandy loam, fine gravelly sandy loam, fine gravelly coarse sandy loam. | SM | A-1, A-2 | 0 | 90-100 | 70-85 | 35-50 | 20-30 | --- | NP-5 |
| | 30-43 | Very gravelly coarse sandy loam, fine gravelly coarse sandy loam. | SM | A-1 | 0 | 75-85 | 30-60 | 15-40 | 10-25 | --- | NP |
| | 43-47 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Choop----------- | 0-5 | Fine gravelly loamy coarse sand. | SM | A-1 | 0 | 70-95 | 50-75 | 25-50 | 10-25 | --- | NP |
| | 5-16 | Very gravelly loamy coarse sand, extremely gravelly loamy coarse sand. | GP-GM, GM, SP-SM, SM | A-1 | 0 | 40-75 | 20-50 | 10-30 | 5-15 | --- | NP |
| | 16-20 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 205, 206: | | | | | | | | | | | |
| Vanvor---------- | 0-6 | Very gravelly sandy clay loam. | GM-GC, GM | A-2, A-1 | 0-5 | 35-55 | 30-50 | 25-45 | 15-25 | 25-35 | 5-10 |
| | 6-24 | Very gravelly sandy clay loam, very gravelly clay loam, very gravelly loam. | GM-GC, GC | A-2, A-1 | 0-10 | 30-50 | 25-45 | 20-40 | 15-35 | 25-40 | 5-15 |
| | 24-31 | Extremely gravelly clay loam, extremely gravelly sandy clay loam. | GP-GC, GM-GC, GC | A-2, A-1 | 0-25 | 25-30 | 20-25 | 15-20 | 5-15 | 25-40 | 5-15 |
| | 31-35 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hoosimbim------- | 0-4 | Extremely gravelly sandy loam. | GP-GM | A-1 | 0-5 | 20-30 | 15-25 | 10-15 | 5-10 | 20-30 | NP-5 |
| | 4-16 | Very gravelly sandy clay loam, very gravelly clay loam. | GC | A-2 | 0-10 | 30-50 | 25-45 | 20-40 | 10-35 | 30-40 | 10-20 |
| | 16-42 | Extremely gravelly sandy clay loam. | GP-GC, GC | A-2 | 5-10 | 15-30 | 10-25 | 5-20 | 5-15 | 30-40 | 10-20 |
| | 42-46 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 207: | | | | | | | | | | | |
| Vitzthum-------- | 0-6 | Very gravelly loam. | GM | A-1, A-2 | 0 | 30-45 | 25-40 | 20-35 | 15-25 | 25-35 | NP-10 |
| | 6-18 | Extremely gravelly sandy clay loam, extremely gravelly clay loam, very gravelly loam. | GP-GC, GM-GC, GC | A-2 | 0-10 | 20-45 | 15-35 | 10-30 | 5-15 | 25-35 | 5-15 |
| | 18 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cargent--------- | 0-3 | Very gravelly sandy clay loam. | GM-GC, GM | A-2, A-1 | 0-10 | 40-55 | 35-50 | 30-45 | 15-25 | 25-35 | 5-10 |
| | 3-21 | Very gravelly clay loam, very gravelly loam. | GM-GC, GM | A-2, A-1 | 5-20 | 40-55 | 35-50 | 30-50 | 20-35 | 25-35 | 5-10 |
| | 21-32 | Extremely gravelly loam, extremely gravelly clay loam. | GP-GM, GM-GC, GM | A-2, A-1 | 5-20 | 20-30 | 15-25 | 10-20 | 5-15 | 25-35 | 5-10 |
| | 32-36 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 208, 209--------- | 0-4 | Loam---------- | CL-ML, ML | A-4 | 0-5 | 85-95 | 80-90 | 70-85 | 50-60 | 25-35 | 5-10 |
| Weaverville | 4-56 | Gravelly clay loam, clay loam, gravelly loam. | ML, MH, GM | A-7, A-6 | 0-10 | 70-90 | 65-85 | 60-80 | 40-55 | 35-55 | 10-20 |
| | 56-81 | Very gravelly clay loam, gravelly clay loam, cobbly clay loam. | ML, MH, GM | A-6, A-7 | 5-25 | 60-80 | 55-75 | 50-70 | 40-55 | 35-55 | 10-20 |
| 210: | | | | | | | | | | | |
| Weitchpec------- | 0-10 | Gravelly loam---- | GM-GC, GM, SC-SM, SM | A-4 | 0-5 | 55-80 | 50-75 | 45-60 | 35-50 | 25-35 | 5-10 |
| | 10-29 | Very gravelly sandy loam, very gravelly sandy clay loam, very gravelly loam. | GM-GC | A-2 | 0-5 | 30-55 | 25-50 | 15-40 | 10-25 | 20-30 | 5-10 |
| | 29 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dubakella------- | 0-5 | Cobbly clay loam | GC, CL | A-6 | 10-30 | 70-90 | 65-85 | 60-75 | 45-55 | 30-40 | 10-15 |
| | 5-34 | Very gravelly clay loam, very cobbly clay loam. | GC, SC | A-7, A-2 | 10-35 | 50-75 | 35-60 | 30-55 | 25-50 | 40-55 | 20-30 |
| | 34 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 211: | | | | | | | | | | | |
| Weitchpec Variant-------- | 0-9 | Gravelly loam---- | SC-SM, SM | A-4 | 0-10 | 70-80 | 65-75 | 55-65 | 40-50 | 25-35 | 5-10 |
| | 9-30 | Very gravelly clay loam. | GC | A-2, A-6, A-7 | 5-20 | 45-60 | 40-55 | 35-50 | 30-45 | 30-45 | 10-20 |
| | 30-48 | Extremely gravelly clay loam. | GC | A-2 | 10-35 | 25-35 | 20-30 | 15-25 | 10-20 | 30-45 | 10-20 |
| | 48-52 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bamtush Variant very gravelly loam---------- | 0-6 | Very gravelly loam. | GM-GC, GM | A-2 | 0-10 | 40-55 | 35-50 | 30-45 | 25-35 | 25-35 | 5-10 |
| | 6-15 | Very gravelly loam. | GM-GC, GM | A-2 | 0-10 | 40-55 | 35-50 | 30-45 | 25-35 | 25-35 | 5-10 |
| | 15-69 | Very gravelly clay loam, extremely gravelly clay loam. | GC | A-2 | 10-20 | 25-45 | 20-40 | 15-35 | 10-30 | 30-40 | 10-20 |
| | 69-78 | Extremely gravelly clay. | GC | A-2 | 10-25 | 20-30 | 15-25 | 15-20 | 10-15 | 40-55 | 20-30 |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 211: | | | | | | | | | | | |
| Bamtush Variant loam---------- | 0-6 | Loam---------- | CL-ML, ML | A-4 | 0-10 | 80-90 | 75-85 | 65-75 | 50-60 | 25-35 | 5-10 |
| | 6-15 | Very gravelly loam. | GM-GC, GM | A-2 | 0-10 | 40-55 | 35-50 | 30-45 | 25-35 | 25-35 | 5-10 |
| | 15-69 | Very gravelly clay loam, extremely gravelly clay loam. | GC | A-2 | 10-20 | 25-45 | 20-40 | 15-35 | 10-30 | 30-40 | 10-20 |
| | 69-78 | Extremely gravelly clay. | GC | A-2 | 10-25 | 20-30 | 15-25 | 15-20 | 10-15 | 40-55 | 20-30 |
| 212: | | | | | | | | | | | |
| Weitchpec Variant-------- | 0-9 | Gravelly loam---- | SC-SM, SM | A-4 | 0-10 | 70-80 | 65-75 | 55-65 | 40-50 | 25-35 | 5-10 |
| | 9-30 | Very gravelly clay loam. | GC | A-2, A-6, A-7 | 5-20 | 45-60 | 40-55 | 35-50 | 30-45 | 30-45 | 10-20 |
| | 30-48 | Extremely gravelly clay loam. | GC | A-2 | 10-35 | 25-35 | 20-30 | 15-25 | 10-20 | 30-45 | 10-20 |
| | 48-52 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bamtush Variant- | 0-6 | Very gravelly loam. | GM-GC, GM | A-2 | 0-10 | 40-55 | 35-50 | 30-45 | 25-35 | 25-35 | 5-10 |
| | 6-15 | Very gravelly loam. | GM-GC, GM | A-2 | 0-10 | 40-55 | 35-50 | 30-45 | 25-35 | 25-35 | 5-10 |
| | 15-69 | Very gravelly clay loam, extremely gravelly clay loam. | GC | A-2 | 10-20 | 25-45 | 20-40 | 15-35 | 10-30 | 30-40 | 10-20 |
| | 69-78 | Extremely gravelly clay. | GC | A-2 | 10-25 | 20-30 | 15-25 | 15-20 | 10-15 | 40-55 | 20-30 |
| 213: | | | | | | | | | | | |
| Xeralfs---------- | 0-1 | Very gravelly clay loam. | GC | A-2 | 0-10 | 40-60 | 35-50 | 30-50 | 25-35 | 30-40 | 10-15 |
| | 1-30 | Extremely gravelly clay loam, very gravelly clay loam, gravelly loam. | GC, SC, CL | A-2, A-4, A-6 | 5-15 | 30-80 | 25-75 | 20-70 | 15-70 | 20-40 | 5-15 |
| | 30-34 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Xerorthents------ | 0-4 | Very gravelly clay loam. | GC | A-6, A-2 | 0-10 | 40-55 | 35-50 | 30-45 | 25-40 | 25-35 | 10-15 |
| | 4-12 | Extremely gravelly loam. | GM-GC, GC, GP-GC | A-1, A-2 | 0-15 | 25-40 | 20-35 | 15-30 | 10-25 | 20-30 | 5-10 |
| | 12-16 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 215---------- | 0-3 | Cobbly clay loam | CL | A-4, A-5 | 20-30 | 80-95 | 75-90 | 70-85 | 55-65 | 30-45 | 10-20 |
| Xererts | 3-60 | Clay loam, clay | CL, CH | A-6, A-7 | 0 | 80-95 | 75-90 | 70-85 | 70-80 | 35-65 | 15-50 |
| 216: | | | | | | | | | | | |
| Xererts---------- | 0-3 | Cobbly clay loam | CL | A-4, A-5 | 20-30 | 80-95 | 75-90 | 70-85 | 55-65 | 30-45 | 10-20 |
| | 3-60 | Clay loam, clay | CL, CH | A-6, A-7 | 0 | 80-95 | 75-90 | 70-85 | 70-80 | 35-65 | 15-50 |

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Fragments | Percentage passing sieve number-- | | | | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 216: | | | | | | | | | | | |
| Haysum---------- | 0-15 | Loam---------- | CL-ML, CL | A-4 | 0 | 90-100 | 85-100 | 75-85 | 50-65 | 25-35 | 5-10 |
| | 15-60 | Gravelly clay loam, gravelly loam, clay loam. | GC, CL | A-6 | 0-10 | 55-85 | 50-80 | 45-75 | 35-65 | 30-40 | 10-20 |
| 217: | | | | | | | | | | | |
| Xerofluvents---- | 0-5 | Gravelly sand---- | SP-SM | A-1 | 0-15 | 60-80 | 50-75 | 25-50 | 5-10 | --- | NP |
| | 5-60 | Extremely gravelly coarse sand, very gravelly fine sandy loam. | GM | A-1 | 0-20 | 35-55 | 25-50 | 15-40 | 0-25 | 10-20 | NP-5 |
| Riverwash------- | 0-5 | Gravelly coarse sand. | SM | A-3 | 0-15 | 60-80 | 50-75 | 25-50 | 5-10 | --- | NP |
| | 5-60 | Stratified gravelly sand to extremely gravelly coarse sand. | GM, SM | A-1, A-2 | 0-20 | 35-55 | 25-50 | 15-40 | 0-25 | 10-20 | NP-5 |
| 218, 219: | | | | | | | | | | | |
| Xerorthents----- | 0-4 | Very gravelly clay loam. | GC | A-6, A-2 | 0-10 | 40-55 | 35-50 | 30-45 | 25-40 | 25-35 | 10-15 |
| | 4-12 | Extremely gravelly loam. | GM-GC, GC, GP-GC | A-1, A-2 | 0-15 | 25-40 | 20-35 | 15-30 | 10-25 | 20-30 | 5-10 |
| | 12-16 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Rock outcrop---- | 0-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors—T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

| Soil name and map symbol | Depth | Clay | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors | | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | K | T | |
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 101---------- | 0-8 | 5-10 | 6.0-20 | 0.02-0.03 | 5.6-7.3 | Low---------- | 0.05 | 5 | .5-2 |
| Atter | 8-60 | 5-10 | 6.0-20 | 0.02-0.03 | 5.6-7.3 | Low---------- | 0.05 | | |
| 102: | | | | | | | | | |
| Atter---------- | 0-8 | 5-10 | 6.0-20 | 0.02-0.03 | 5.6-7.3 | Low---------- | 0.05 | 5 | .5-2 |
| | 8-60 | 5-10 | 6.0-20 | 0.02-0.03 | 5.6-7.3 | Low---------- | 0.05 | | |
| Dumps---------- | 0-5 | 0-5 | 6.0-20 | 0.04-0.06 | 6.6-7.3 | Low---------- | 0.05 | 5 | 0-.5 |
| | 5-60 | 0-10 | 2.0-20 | 0.03-0.07 | 6.1-7.3 | Low---------- | 0.02 | | |
| Xerofluvents---- | 0-5 | 0-5 | 6.0-20 | 0.04-0.06 | 6.6-7.3 | Low---------- | 0.05 | 5 | 0-.5 |
| | 5-60 | 0-10 | 2.0-20 | 0.03-0.07 | 6.1-7.3 | Low---------- | 0.02 | | |
| 103, 104: | | | | | | | | | |
| Bamtush--------- | 0-6 | 18-25 | 0.6-2.0 | 0.04-0.07 | 5.6-7.3 | Low---------- | 0.10 | 5 | 1-3 |
| | 6-14 | 20-27 | 0.6-2.0 | 0.09-0.10 | 5.6-6.5 | Low---------- | 0.10 | | |
| | 14-67 | 25-35 | 0.6-2.0 | 0.05-0.08 | 5.1-6.5 | Low---------- | 0.10 | | |
| Brownbear------- | 0-4 | 20-25 | 0.6-2.0 | 0.09-0.12 | 5.1-7.3 | Low---------- | 0.15 | 2 | 1-4 |
| | 4-9 | 23-30 | 0.6-2.0 | 0.09-0.12 | 5.1-7.3 | Low---------- | 0.15 | | |
| | 9-16 | 25-30 | 0.6-2.0 | 0.12-0.15 | 5.1-7.3 | Low---------- | 0.15 | | |
| | 16-32 | 25-30 | 0.6-2.0 | 0.04-0.05 | 5.1-7.3 | Low---------- | 0.05 | | |
| | 32-36 | --- | --- | --- | --- | ---------- | ---- | | |
| 105: | | | | | | | | | |
| Bamtush--------- | 0-6 | 18-25 | 0.6-2.0 | 0.04-0.07 | 5.6-7.3 | Low---------- | 0.10 | 5 | 1-3 |
| | 6-14 | 20-27 | 0.6-2.0 | 0.09-0.10 | 5.6-6.5 | Low---------- | 0.10 | | |
| | 14-67 | 25-35 | 0.6-2.0 | 0.05-0.08 | 5.1-6.5 | Low---------- | 0.10 | | |
| Brownbear------- | 0-4 | 20-25 | 0.6-2.0 | 0.09-0.12 | 5.1-7.3 | Low---------- | 0.15 | 2 | 1-4 |
| | 4-9 | 23-30 | 0.6-2.0 | 0.09-0.12 | 5.1-7.3 | Low---------- | 0.15 | | |
| | 9-16 | 25-30 | 0.6-2.0 | 0.12-0.15 | 5.1-7.3 | Low---------- | 0.15 | | |
| | 16-32 | 25-30 | 0.6-2.0 | 0.04-0.05 | 5.1-7.3 | Low---------- | 0.05 | | |
| | 32-36 | --- | --- | --- | --- | ---------- | ---- | | |
| Weaverville----- | 0-4 | 20-27 | 0.6-2.0 | 0.13-0.17 | 6.1-7.3 | Low---------- | 0.24 | 5 | 2-4 |
| | 4-56 | 25-35 | 0.2-0.6 | 0.10-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |
| | 56-81 | 27-35 | 0.2-0.6 | 0.09-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |
| 106: | | | | | | | | | |
| Bamtush--------- | 0-6 | 18-25 | 0.6-2.0 | 0.04-0.07 | 5.6-7.3 | Low---------- | 0.10 | 5 | 1-3 |
| | 6-14 | 20-27 | 0.6-2.0 | 0.09-0.10 | 5.6-6.5 | Low---------- | 0.10 | | |
| | 14-67 | 25-35 | 0.6-2.0 | 0.05-0.08 | 5.1-6.5 | Low---------- | 0.10 | | |
| Weaverville----- | 0-4 | 20-27 | 0.6-2.0 | 0.13-0.17 | 6.1-7.3 | Low---------- | 0.24 | 5 | 2-4 |
| | 4-56 | 25-35 | 0.2-0.6 | 0.10-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |
| | 56-81 | 27-35 | 0.2-0.6 | 0.09-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |
| 107: | | | | | | | | | |
| Bamtush--------- | 0-6 | 18-25 | 0.6-2.0 | 0.04-0.07 | 5.6-7.3 | Low---------- | 0.10 | 5 | 1-3 |
| | 6-14 | 20-27 | 0.6-2.0 | 0.09-0.10 | 5.6-6.5 | Low---------- | 0.10 | | |
| | 14-67 | 25-35 | 0.6-2.0 | 0.05-0.08 | 5.1-6.5 | Low---------- | 0.10 | | |
| Weaverville----- | 0-4 | 20-27 | 0.6-2.0 | 0.13-0.17 | 6.1-7.3 | Low---------- | 0.24 | 5 | 2-4 |
| | 4-56 | 25-35 | 0.2-0.6 | 0.10-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |
| | 56-81 | 27-35 | 0.2-0.6 | 0.09-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors | | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | K | T | |
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 107: | | | | | | | | | |
| Brownbear------- | 0-4 | 20-25 | 0.6-2.0 | 0.09-0.12 | 5.1-7.3 | Low---------- | 0.15 | 2 | 1-4 |
| | 4-9 | 23-30 | 0.6-2.0 | 0.09-0.12 | 5.1-7.3 | Low---------- | 0.15 | | |
| | 9-16 | 25-30 | 0.6-2.0 | 0.12-0.15 | 5.1-7.3 | Low---------- | 0.15 | | |
| | 16-32 | 25-30 | 0.6-2.0 | 0.04-0.05 | 5.1-7.3 | Low---------- | 0.05 | | |
| | 32-36 | --- | --- | --- | --- | ---------- | ---- | | |
| 109: | | | | | | | | | |
| Barpeak--------- | 0-3 | 18-25 | 0.6-2.0 | 0.06-0.08 | 6.1-6.5 | Low---------- | 0.10 | 5 | 2-3 |
| | 3-8 | 18-25 | 0.6-2.0 | 0.05-0.06 | 5.6-7.3 | Low---------- | 0.10 | | |
| | 8-61 | 18-25 | 0.6-2.0 | 0.02-0.05 | 5.6-7.3 | Low---------- | 0.10 | | |
| Sheetiron------- | 0-4 | 10-25 | 0.6-2.0 | 0.07-0.10 | 5.1-6.0 | Low---------- | 0.15 | 2 | 1-2 |
| | 4-19 | 12-25 | 0.6-2.0 | 0.05-0.10 | 5.1-6.0 | Low---------- | 0.15 | | |
| | 19-24 | 12-25 | 0.6-2.0 | 0.04-0.07 | 5.1-6.0 | Low---------- | 0.10 | | |
| | 24 | --- | --- | --- | --- | ---------- | ---- | | |
| 110: | | | | | | | | | |
| Beargulch------- | 0-12 | 18-22 | 0.6-2.0 | 0.08-0.09 | 5.6-6.5 | Low---------- | 0.15 | 3 | 2-3 |
| | 12-43 | 15-25 | 0.6-2.0 | 0.02-0.05 | 5.6-6.5 | Low---------- | 0.10 | | |
| | 43 | --- | --- | --- | --- | ---------- | ---- | | |
| Skyrock--------- | 0-4 | 18-25 | 0.6-2.0 | 0.04-0.05 | 5.6-6.5 | Low---------- | 0.05 | 1 | 1-2 |
| | 4-10 | 18-25 | 0.6-2.0 | 0.06-0.08 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 10-18 | 18-25 | 0.6-2.0 | 0.05-0.06 | 5.1-6.5 | Low---------- | 0.05 | | |
| | 18-22 | --- | --- | --- | --- | ---------- | ---- | | |
| 111: | | | | | | | | | |
| Brockgulch------ | 0-3 | 14-23 | 0.6-2.0 | 0.07-0.08 | 6.1-7.3 | Low---------- | 0.10 | 2 | 1-2 |
| | 3-16 | 15-25 | 0.6-2.0 | 0.07-0.08 | 6.1-7.3 | Low---------- | 0.15 | | |
| | 16-24 | 15-25 | 0.6-2.0 | 0.04-0.07 | 5.6-7.3 | Low---------- | 0.10 | | |
| | 24-28 | --- | --- | --- | --- | ---------- | ---- | | |
| Dedrick--------- | 0-3 | 15-25 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | 1 | 1-2 |
| | 3-15 | 14-27 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | | |
| | 15-19 | --- | --- | --- | --- | ---------- | ---- | | |
| Brownbear------- | 0-4 | 20-25 | 0.6-2.0 | 0.09-0.12 | 5.1-7.3 | Low---------- | 0.15 | 2 | 1-4 |
| | 4-9 | 23-30 | 0.6-2.0 | 0.09-0.12 | 5.1-7.3 | Low---------- | 0.15 | | |
| | 9-16 | 25-30 | 0.6-2.0 | 0.12-0.15 | 5.1-7.3 | Low---------- | 0.15 | | |
| | 16-32 | 25-30 | 0.6-2.0 | 0.04-0.05 | 5.1-7.3 | Low---------- | 0.05 | | |
| | 32-36 | --- | --- | --- | --- | ---------- | ---- | | |
| 112: | | | | | | | | | |
| Brownbear------- | 0-4 | 20-25 | 0.6-2.0 | 0.09-0.12 | 5.1-7.3 | Low---------- | 0.15 | 2 | 1-4 |
| | 4-9 | 23-30 | 0.6-2.0 | 0.09-0.12 | 5.1-7.3 | Low---------- | 0.15 | | |
| | 9-16 | 25-30 | 0.6-2.0 | 0.12-0.15 | 5.1-7.3 | Low---------- | 0.15 | | |
| | 16-32 | 25-30 | 0.6-2.0 | 0.04-0.05 | 5.1-7.3 | Low---------- | 0.05 | | |
| | 32-36 | --- | --- | --- | --- | ---------- | ---- | | |
| Bamtush--------- | 0-6 | 18-25 | 0.6-2.0 | 0.04-0.07 | 5.6-7.3 | Low---------- | 0.10 | 5 | 1-3 |
| | 6-14 | 20-27 | 0.6-2.0 | 0.09-0.10 | 5.6-6.5 | Low---------- | 0.10 | | |
| | 14-67 | 25-35 | 0.6-2.0 | 0.05-0.08 | 5.1-6.5 | Low---------- | 0.10 | | |
| 113, 114--------- | 0-6 | 20-25 | 0.6-2.0 | 0.11-0.14 | 5.6-7.3 | Low---------- | 0.24 | 2 | 2-3 |
| Brownscreek | 6-24 | 25-30 | 0.6-2.0 | 0.09-0.12 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 24-34 | 25-30 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low---------- | 0.05 | | |
| | 34-38 | --- | --- | --- | --- | ---------- | ---- | | |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors | | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | K | T | |
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 115: | | | | | | | | | |
| Brownscreek----- | 0-6 | 20-25 | 0.6-2.0 | 0.11-0.14 | 5.6-7.3 | Low---------- | 0.24 | 2 | 2-3 |
| | 6-24 | 25-30 | 0.6-2.0 | 0.09-0.12 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 24-34 | 25-30 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low---------- | 0.05 | | |
| | 34-38 | --- | --- | --- | --- | ---------- | ---- | | |
| Dedrick--------- | 0-3 | 15-25 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | 1 | 1-2 |
| | 3-15 | 14-27 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | | |
| | 15-19 | --- | --- | --- | --- | ---------- | ---- | | |
| 116, 117: | | | | | | | | | |
| Brownscreek----- | 0-6 | 20-25 | 0.6-2.0 | 0.11-0.14 | 5.6-7.3 | Low---------- | 0.24 | 2 | 2-3 |
| | 6-24 | 25-30 | 0.6-2.0 | 0.09-0.12 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 24-34 | 25-30 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low---------- | 0.05 | | |
| | 34-38 | --- | --- | --- | --- | ---------- | ---- | | |
| Dougcity-------- | 0-13 | 20-25 | 0.6-2.0 | 0.11-0.14 | 6.1-7.3 | Low---------- | 0.24 | 5 | 2-5 |
| | 13-80 | 25-35 | 0.2-0.6 | 0.07-0.10 | 5.6-7.3 | Low---------- | 0.15 | | |
| 118, 119: | | | | | | | | | |
| Cargent--------- | 0-3 | 20-25 | 0.6-2.0 | 0.08-0.11 | 6.1-7.3 | Low---------- | 0.15 | 2 | 1-2 |
| | 3-21 | 20-30 | 0.6-2.0 | 0.09-0.11 | 6.1-7.3 | Low---------- | 0.15 | | |
| | 21-32 | 20-30 | 0.6-2.0 | 0.05-0.06 | 6.1-7.3 | Low---------- | 0.10 | | |
| | 32-36 | --- | --- | --- | --- | ---------- | ---- | | |
| Demogul--------- | 0-4 | 22-26 | 0.6-2.0 | 0.11-0.14 | 6.1-7.3 | Low---------- | 0.24 | 5 | 2-5 |
| | 4-34 | 27-35 | 0.2-0.6 | 0.12-0.15 | 5.1-6.5 | Low---------- | 0.20 | | |
| | 34-68 | 27-35 | 0.6-2.0 | 0.11-0.14 | 5.1-6.5 | Low---------- | 0.15 | | |
| 120, 121--------- | 0-3 | 15-20 | 0.6-2.0 | 0.03-0.05 | 5.6-6.5 | Low---------- | 0.10 | 2 | 1-3 |
| Caris | 3-33 | 18-27 | 0.6-2.0 | 0.03-0.08 | 5.6-6.5 | Low---------- | 0.10 | | |
| | 33 | --- | --- | --- | --- | ---------- | ---- | | |
| 122: | | | | | | | | | |
| Caris----------- | 0-3 | 15-20 | 0.6-2.0 | 0.03-0.05 | 5.6-6.5 | Low---------- | 0.10 | 2 | 1-3 |
| | 3-33 | 18-27 | 0.6-2.0 | 0.03-0.08 | 5.6-6.5 | Low---------- | 0.10 | | |
| | 33 | --- | --- | --- | --- | ---------- | ---- | | |
| Indleton-------- | 0-11 | 15-20 | 0.6-2.0 | 0.03-0.04 | 5.6-6.5 | Low---------- | 0.05 | 5 | 1-2 |
| | 11-22 | 18-25 | 0.6-2.0 | 0.03-0.06 | 5.6-6.5 | Low---------- | 0.05 | | |
| | 22-60 | 18-25 | 0.6-2.0 | 0.03-0.06 | 5.6-6.5 | Low---------- | 0.05 | | |
| Hoosimbim------- | 0-4 | 15-20 | 0.6-2.0 | 0.03-0.04 | 5.6-6.5 | Low---------- | 0.10 | 3 | 1-2 |
| | 4-16 | 25-35 | 0.6-2.0 | 0.08-0.10 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 16-42 | 25-35 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 42-46 | --- | --- | --- | --- | ---------- | ---- | | |
| 123, 124--------- | 0-12 | 20-25 | 0.6-2.0 | 0.10-0.14 | 6.1-7.3 | Low---------- | 0.20 | 5 | 1-3 |
| Carrcreek | 12-50 | 25-35 | 0.6-2.0 | 0.09-0.13 | 6.1-7.8 | Low---------- | 0.10 | | |
| | 50-60 | 25-30 | 0.6-2.0 | 0.06-0.08 | 6.1-7.8 | Low---------- | 0.10 | | |
| 125--------------- | 0-5 | 2-5 | 6.0-20 | 0.03-0.06 | 5.1-6.0 | Low---------- | 0.10 | 1 | 1-2 |
| Choop | 5-16 | 2-5 | 6.0-20 | 0.02-0.03 | 5.6-6.5 | Low---------- | 0.05 | | |
| | 16-20 | --- | --- | --- | --- | ---------- | ---- | | |
| 126: | | | | | | | | | |
| Choop------------ | 0-12 | 2-5 | 6.0-20 | 0.03-0.06 | 5.1-6.0 | Low---------- | 0.10 | 1 | 1-2 |
| | 12 | --- | --- | --- | --- | ---------- | ---- | | |
| Rock outcrop. | | | | | | | | | |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors | | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | K | T | |
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 127, 128--------- | 0-5 | 20-27 | 0.6-2.0 | 0.13-0.17 | 6.1-7.3 | Low---------- | 0.32 | 5 | 1-3 |
| Crefork | 5-43 | 40-55 | 0.00-0.06 | 0.12-0.14 | 5.1-7.3 | High---------- | 0.20 | | |
| | 43-63 | 30-40 | 0.06-0.2 | 0.12-0.14 | 5.1-7.3 | Moderate------- | 0.20 | | |
| 129--------------- | 0-5 | 28-35 | 0.2-0.6 | 0.16-0.18 | 6.1-7.3 | Moderate------- | 0.28 | 5 | 1-3 |
| Crefork | 5-43 | 40-55 | 0.00-0.06 | 0.12-0.14 | 5.1-7.3 | High---------- | 0.20 | | |
| | 43-63 | 30-40 | 0.06-0.2 | 0.12-0.14 | 5.1-7.3 | Moderate------- | 0.20 | | |
| 131: | | | | | | | | | |
| Crefork--------- | 0-5 | 20-27 | 0.6-2.0 | 0.13-0.17 | 6.1-7.3 | Low---------- | 0.32 | 5 | 1-3 |
| | 5-43 | 40-55 | 0.00-0.06 | 0.12-0.14 | 5.1-7.3 | High---------- | 0.20 | | |
| | 43-63 | 30-40 | 0.06-0.2 | 0.12-0.14 | 5.1-7.3 | Moderate------- | 0.20 | | |
| Musserhill------ | 0-5 | 25-27 | 0.2-0.6 | 0.14-0.17 | 6.1-7.3 | Low---------- | 0.20 | 3 | 2-3 |
| | 5-11 | 27-35 | 0.2-0.6 | 0.10-0.13 | 6.1-7.3 | Moderate------- | 0.10 | | |
| | 11-32 | 27-35 | 0.2-0.6 | 0.05-0.08 | 6.1-7.3 | Moderate------- | 0.10 | | |
| | 32-36 | --- | --- | --- | --- | ---------- | ---- | | |
| 132--------------- | 0-3 | 15-25 | 0.6-2.0 | 0.09-0.12 | 6.1-7.3 | Low---------- | 0.20 | 1 | 1-2 |
| Dedrick | 3-15 | 14-27 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | | |
| | 15-19 | --- | --- | --- | --- | ---------- | ---- | | |
| 133: | | | | | | | | | |
| Dedrick--------- | 0-3 | 15-25 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | 1 | 1-2 |
| | 3-15 | 14-27 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | | |
| | 15-19 | --- | --- | --- | --- | ---------- | ---- | | |
| Rock outcrop. | | | | | | | | | |
| 134--------------- | 0-4 | 22-26 | 0.6-2.0 | 0.11-0.14 | 6.1-7.3 | Low---------- | 0.24 | 5 | 2-5 |
| Demogul | 4-34 | 27-35 | 0.2-0.6 | 0.12-0.15 | 5.1-6.5 | Low---------- | 0.20 | | |
| | 34-68 | 27-35 | 0.6-2.0 | 0.11-0.14 | 5.1-6.5 | Low---------- | 0.15 | | |
| 136: | | | | | | | | | |
| Dougcity-------- | 0-13 | 20-25 | 0.6-2.0 | 0.11-0.14 | 6.1-7.3 | Low---------- | 0.24 | 5 | 2-5 |
| | 13-80 | 25-35 | 0.2-0.6 | 0.07-0.10 | 5.6-7.3 | Low---------- | 0.15 | | |
| Dedrick--------- | 0-3 | 15-25 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | 1 | 1-2 |
| | 3-15 | 14-27 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | | |
| | 15-19 | --- | --- | --- | --- | ---------- | ---- | | |
| 137: | | | | | | | | | |
| Dougcity-------- | 0-13 | 20-25 | 0.6-2.0 | 0.11-0.14 | 6.1-7.3 | Low---------- | 0.24 | 5 | 2-5 |
| | 13-80 | 25-35 | 0.2-0.6 | 0.07-0.10 | 5.6-7.3 | Low---------- | 0.15 | | |
| Demogul--------- | 0-4 | 22-26 | 0.6-2.0 | 0.11-0.14 | 6.1-7.3 | Low---------- | 0.24 | 5 | 2-5 |
| | 4-34 | 27-35 | 0.2-0.6 | 0.12-0.15 | 5.1-6.5 | Low---------- | 0.20 | | |
| | 34-68 | 27-35 | 0.6-2.0 | 0.11-0.14 | 5.1-6.5 | Low---------- | 0.15 | | |
| 138, 139, 140---- | 0-5 | 27-35 | 0.2-0.6 | 0.11-0.15 | 5.6-7.3 | Moderate------- | 0.20 | 2 | 4-10 |
| Dubakella | 5-34 | 35-50 | 0.06-0.2 | 0.08-0.10 | 6.1-7.8 | Moderate------- | 0.10 | | |
| | 34 | --- | --- | --- | --- | ---------- | ---- | | |
| 141--------------- | 0-5 | 20-27 | 0.2-0.6 | 0.10-0.15 | 5.6-7.3 | Moderate------- | 0.20 | 2 | 4-10 |
| Dubakella | 5-34 | 35-50 | 0.06-0.2 | 0.08-0.10 | 6.1-7.8 | Moderate------- | 0.10 | | |
| | 34 | --- | --- | --- | --- | ---------- | ---- | | |
| 142--------------- | 0-4 | 12-18 | 0.6-2.0 | 0.04-0.10 | 5.1-6.5 | Low---------- | 0.10 | 1 | 1-2 |
| Etsel | 4-14 | 12-18 | 0.6-2.0 | 0.04-0.10 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 14 | --- | --- | --- | --- | ---------- | ---- | | |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors | | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | K | T | |
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 143: | | | | | | | | | |
| Etsel | 0-4 | 12-18 | 0.6-2.0 | 0.04-0.10 | 5.1-6.5 | Low | 0.10 | 1 | 1-2 |
| | 4-14 | 12-18 | 0.6-2.0 | 0.04-0.10 | 5.1-6.5 | Low | 0.10 | | |
| | 14 | --- | --- | --- | --- | --- | --- | | |
| Bamtush | 0-6 | 18-25 | 0.6-2.0 | 0.04-0.07 | 5.6-7.3 | Low | 0.10 | 5 | 1-3 |
| | 6-14 | 20-27 | 0.6-2.0 | 0.09-0.10 | 5.6-6.5 | Low | 0.10 | | |
| | 14-67 | 25-35 | 0.6-2.0 | 0.05-0.08 | 5.1-6.5 | Low | 0.10 | | |
| 144: | | | | | | | | | |
| Etsel | 0-6 | 12-18 | 0.6-2.0 | 0.04-0.10 | 5.1-6.5 | Low | 0.10 | 1 | 1-2 |
| | 6-17 | 12-18 | 0.6-2.0 | 0.04-0.10 | 5.1-6.5 | Low | 0.10 | | |
| | 17 | --- | --- | --- | --- | --- | --- | | |
| Weitchpec | 0-10 | 20-25 | 0.6-2.0 | 0.10-0.14 | 6.1-7.3 | Low | 0.24 | 2 | 1-3 |
| | 10-29 | 15-25 | 0.6-2.0 | 0.04-0.09 | 6.1-7.3 | Low | 0.15 | | |
| | 29 | --- | --- | --- | --- | --- | --- | | |
| 145: | | | | | | | | | |
| Goulding | 0-6 | 20-27 | 0.6-2.0 | 0.11-0.13 | 5.1-6.5 | Low | 0.10 | 1 | 1-2 |
| | 6-13 | 20-30 | 0.6-2.0 | 0.05-0.12 | 5.1-6.5 | Low | 0.15 | | |
| | 13 | --- | --- | --- | --- | --- | --- | | |
| Holkat Variant | 0-11 | 27-30 | 0.6-2.0 | 0.15-0.19 | 6.1-7.3 | Moderate | 0.32 | 2 | 2-3 |
| | 11-23 | 18-30 | 0.6-2.0 | 0.11-0.14 | 6.1-7.3 | Low | 0.24 | | |
| | 23 | --- | --- | --- | --- | --- | --- | | |
| Marpa Variant | 0-10 | 27-30 | 0.2-0.6 | 0.14-0.17 | 5.1-5.5 | Moderate | 0.15 | 2 | 1-2 |
| | 10-19 | 30-35 | 0.2-0.6 | 0.09-0.11 | 5.6-6.0 | Moderate | 0.10 | | |
| | 19-36 | 40-50 | 0.06-0.2 | 0.07-0.09 | 5.6-6.0 | Moderate | 0.10 | | |
| | 36-40 | --- | --- | --- | --- | --- | --- | | |
| 146: | | | | | | | | | |
| Goulding | 0-6 | 20-27 | 0.6-2.0 | 0.11-0.13 | 5.1-6.5 | Low | 0.10 | 1 | 1-2 |
| | 6-13 | 20-30 | 0.6-2.0 | 0.05-0.12 | 5.1-6.5 | Low | 0.15 | | |
| | 13 | --- | --- | --- | --- | --- | --- | | |
| Vitzthum | 0-3 | 15-25 | 0.6-2.0 | 0.06-0.07 | 6.1-7.3 | Low | 0.10 | 1 | 1-2 |
| | 3-17 | 20-30 | 0.6-2.0 | 0.04-0.07 | 5.6-7.3 | Low | 0.10 | | |
| | 17-21 | --- | --- | --- | --- | --- | --- | | |
| Vanvor | 0-6 | 23-25 | 0.6-2.0 | 0.08-0.11 | 6.1-7.3 | Low | 0.10 | 2 | 1-2 |
| | 6-24 | 25-35 | 0.6-2.0 | 0.08-0.10 | 5.1-6.5 | Low | 0.10 | | |
| | 24-31 | 25-35 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low | 0.10 | | |
| | 31-35 | --- | --- | --- | --- | --- | --- | | |
| 147, 148 | 0-10 | 5-10 | 2.0-6.0 | 0.06-0.09 | 5.6-6.5 | Low | 0.10 | 5 | 1-2 |
| Haploxerolls | 10-60 | 5-20 | 2.0-20 | 0.06-0.12 | 5.6-6.5 | Low | 0.15 | | |
| 149 | 0-15 | 20-25 | 0.6-2.0 | 0.14-0.16 | 6.1-7.3 | Low | 0.37 | 5 | 2-3 |
| Haysum | 15-60 | 25-35 | 0.6-2.0 | 0.11-0.16 | 6.1-6.5 | Low | 0.17 | | |
| 150, 151 | 0-15 | 20-25 | 0.6-2.0 | 0.10-0.13 | 6.1-7.3 | Low | 0.20 | 5 | 2-3 |
| Haysum | 15-66 | 25-35 | 0.6-2.0 | 0.11-0.16 | 6.1-6.5 | Low | 0.17 | | |
| | 66-71 | 25-35 | 0.6-2.0 | 0.06-0.08 | 6.1-6.5 | Low | 0.10 | | |
| 152 | 0-15 | 20-25 | 0.6-2.0 | 0.10-0.13 | 6.1-7.3 | Low | 0.20 | 5 | 2-3 |
| Haysum | 15-60 | 25-35 | 0.6-2.0 | 0.11-0.16 | 6.1-6.5 | Low | 0.17 | | |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors | | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | K | T | |
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 153, 154: | | | | | | | | | |
| Holkat---------- | 0-3 | 20-25 | 0.6-2.0 | 0.13-0.17 | 5.6-6.5 | Low---------- | 0.32 | 2 | 1-2 |
| | 3-10 | 24-27 | 0.6-2.0 | 0.11-0.14 | 5.6-6.5 | Low---------- | 0.24 | | |
| | 10-35 | 24-27 | 0.6-2.0 | 0.11-0.14 | 5.6-6.5 | Low---------- | 0.24 | | |
| | 35 | --- | --- | --- | --- | ---------- | ---- | | |
| Hoosimbim------- | 0-4 | 20-25 | 0.6-2.0 | 0.11-0.14 | 5.1-6.5 | Low---------- | 0.24 | 3 | 1-2 |
| | 4-16 | 25-35 | 0.6-2.0 | 0.08-0.10 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 16-42 | 25-35 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 42-46 | --- | --- | --- | --- | ---------- | ---- | | |
| 155: | | | | | | | | | |
| Holkat Variant-- | 0-5 | 18-27 | 0.6-2.0 | 0.11-0.14 | 6.1-7.3 | Low---------- | 0.24 | 2 | 2-3 |
| | 5-35 | 18-30 | 0.6-2.0 | 0.11-0.14 | 6.1-7.3 | Low---------- | 0.24 | | |
| | 35-38 | 18-30 | 0.6-2.0 | 0.07-0.10 | 6.1-7.3 | Low---------- | 0.20 | | |
| | 38-42 | --- | --- | --- | --- | ---------- | ---- | | |
| Dedrick--------- | 0-3 | 15-25 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | 1 | 1-2 |
| | 3-15 | 14-27 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | | |
| | 15-19 | --- | --- | --- | --- | ---------- | ---- | | |
| 156---------- | 0-5 | 20-25 | 0.6-2.0 | 0.11-0.14 | 6.6-7.3 | Low---------- | 0.24 | 3 | 1-3 |
| Hoosimbim | 5-13 | 20-26 | 0.6-2.0 | 0.11-0.14 | 6.1-6.5 | Low---------- | 0.24 | | |
| | 13-42 | 27-35 | 0.2-0.6 | 0.08-0.09 | 6.1-6.5 | Low---------- | 0.15 | | |
| | 42-46 | --- | --- | --- | --- | ---------- | ---- | | |
| 157: | | | | | | | | | |
| Hoosimbim------- | 0-4 | 15-20 | 0.6-2.0 | 0.03-0.04 | 5.6-6.5 | Low---------- | 0.10 | 3 | 1-2 |
| | 4-16 | 25-35 | 0.6-2.0 | 0.08-0.10 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 16-42 | 25-35 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 42-46 | --- | --- | --- | --- | ---------- | ---- | | |
| Bamtush--------- | 0-6 | 18-25 | 0.6-2.0 | 0.04-0.07 | 5.6-7.3 | Low---------- | 0.10 | 5 | 1-3 |
| | 6-14 | 20-27 | 0.6-2.0 | 0.09-0.10 | 5.6-6.5 | Low---------- | 0.10 | | |
| | 14-67 | 25-35 | 0.6-2.0 | 0.05-0.08 | 5.1-6.5 | Low---------- | 0.10 | | |
| Marpa----------- | 0-3 | 20-25 | 0.6-2.0 | 0.06-0.10 | 5.6-7.3 | Low---------- | 0.15 | 2 | .5-2 |
| | 3-31 | 27-35 | 0.6-2.0 | 0.06-0.10 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 31 | --- | --- | --- | --- | ---------- | ---- | | |
| 158: | | | | | | | | | |
| Hoosimbim------- | 0-4 | 15-20 | 0.6-2.0 | 0.03-0.04 | 5.6-6.5 | Low---------- | 0.10 | 3 | 1-2 |
| | 4-16 | 25-35 | 0.6-2.0 | 0.08-0.10 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 16-42 | 25-35 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 42-46 | --- | --- | --- | --- | ---------- | ---- | | |
| Etsel----------- | 0-4 | 12-18 | 0.6-2.0 | 0.04-0.10 | 5.1-6.5 | Low---------- | 0.10 | 1 | 1-2 |
| | 4-14 | 12-18 | 0.6-2.0 | 0.04-0.10 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 14 | --- | --- | --- | --- | ---------- | ---- | | |
| 159: | | | | | | | | | |
| Hoosimbim------- | 0-4 | 15-20 | 0.6-2.0 | 0.03-0.04 | 5.6-6.5 | Low---------- | 0.10 | 3 | 1-2 |
| | 4-16 | 25-35 | 0.6-2.0 | 0.08-0.10 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 16-42 | 25-35 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 42-46 | --- | --- | --- | --- | ---------- | ---- | | |
| Goulding-------- | 0-6 | 20-27 | 0.6-2.0 | 0.11-0.13 | 5.1-6.5 | Low---------- | 0.10 | 1 | 1-2 |
| | 6-13 | 20-30 | 0.6-2.0 | 0.05-0.12 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 13 | --- | --- | --- | --- | ---------- | ---- | | |
| 160, 161--------- | 0-6 | 7-15 | 0.6-2.0 | 0.14-0.16 | 5.6-7.3 | Low---------- | 0.28 | 2 | 1-5 |
| Hotaw | 6-37 | 20-35 | 0.2-0.6 | 0.14-0.18 | 5.1-6.5 | Moderate------- | 0.24 | | |
| | 37 | --- | --- | --- | --- | ---------- | ---- | | |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors | | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | K | T | |
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 162: | | | | | | | | | |
| Indleton-------- | 0-11 | 15-20 | 0.6-2.0 | 0.03-0.04 | 5.6-6.5 | Low---------- | 0.05 | 5 | 1-2 |
| | 11-22 | 18-25 | 0.6-2.0 | 0.03-0.06 | 5.6-6.5 | Low---------- | 0.05 | | |
| | 22-60 | 18-25 | 0.6-2.0 | 0.03-0.06 | 5.6-6.5 | Low---------- | 0.05 | | |
| Caris----------- | 0-3 | 15-20 | 0.6-2.0 | 0.03-0.05 | 5.6-6.5 | Low---------- | 0.10 | 2 | 1-3 |
| | 3-33 | 18-27 | 0.6-2.0 | 0.03-0.08 | 5.6-6.5 | Low---------- | 0.10 | | |
| | 33 | --- | --- | --- | --- | ---------- | ---- | | |
| Hoosimbim------- | 0-4 | 15-20 | 0.6-2.0 | 0.03-0.04 | 5.6-6.5 | Low---------- | 0.10 | 3 | 1-2 |
| | 4-16 | 25-35 | 0.6-2.0 | 0.08-0.10 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 16-42 | 25-35 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 42-46 | --- | --- | --- | --- | ---------- | ---- | | |
| 163, 164--------- | 0-14 | 18-25 | 0.6-2.0 | 0.13-0.16 | 5.6-7.3 | Low---------- | 0.32 | 5 | 1-2 |
| Jafa | 14-67 | 25-35 | 0.2-0.6 | 0.10-0.18 | 5.1-6.5 | Moderate------- | 0.20 | | |
| 165, 166--------- | 0-18 | 20-25 | 0.6-2.0 | 0.11-0.14 | 6.1-7.3 | Low---------- | 0.20 | 5 | 1-3 |
| Jafa | 18-74 | 25-35 | 0.2-0.6 | 0.11-0.14 | 5.6-6.5 | Low---------- | 0.15 | | |
| 167--------------- | 0-10 | 20-25 | 0.6-2.0 | 0.09-0.11 | 6.1-6.5 | Low---------- | 0.24 | 5 | 2-3 |
| Jafa | 10-21 | 25-30 | 0.6-2.0 | 0.11-0.15 | 5.6-6.5 | Low---------- | 0.17 | | |
| | 21-44 | 34-38 | 0.2-0.6 | 0.08-0.10 | 5.6-6.5 | Moderate------- | 0.10 | | |
| | 44-60 | 40-50 | 0.00-0.06 | 0.13-0.14 | 6.1-7.3 | High----------- | 0.17 | | |
| 170: | | | | | | | | | |
| Marpa------------ | 0-3 | 20-25 | 0.6-2.0 | 0.06-0.10 | 5.6-7.3 | Low---------- | 0.15 | 2 | .5-2 |
| | 3-31 | 27-35 | 0.6-2.0 | 0.06-0.10 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 31 | --- | --- | --- | --- | ---------- | ---- | | |
| Hoosimbim------- | 0-4 | 15-20 | 0.6-2.0 | 0.03-0.04 | 5.6-6.5 | Low---------- | 0.10 | 3 | 1-2 |
| | 4-16 | 25-35 | 0.6-2.0 | 0.08-0.10 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 16-42 | 25-35 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 42-46 | --- | --- | --- | --- | ---------- | ---- | | |
| 171: | | | | | | | | | |
| Marpa------------ | 0-3 | 20-25 | 0.6-2.0 | 0.06-0.10 | 5.6-7.3 | Low---------- | 0.15 | 2 | .5-2 |
| | 3-31 | 27-35 | 0.6-2.0 | 0.06-0.10 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 31 | --- | --- | --- | --- | ---------- | ---- | | |
| Hoosimbim------- | 0-4 | 15-20 | 0.6-2.0 | 0.03-0.04 | 5.6-6.5 | Low---------- | 0.10 | 3 | 1-2 |
| | 4-16 | 25-35 | 0.6-2.0 | 0.08-0.10 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 16-42 | 25-35 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 42-46 | --- | --- | --- | --- | ---------- | ---- | | |
| Bamtush---------- | 0-6 | 18-25 | 0.6-2.0 | 0.04-0.07 | 5.6-7.3 | Low---------- | 0.10 | 5 | 1-3 |
| | 6-14 | 20-27 | 0.6-2.0 | 0.09-0.10 | 5.6-6.5 | Low---------- | 0.10 | | |
| | 14-67 | 25-35 | 0.6-2.0 | 0.05-0.08 | 5.1-6.5 | Low---------- | 0.10 | | |
| 172: | | | | | | | | | |
| Marpa------------ | 0-3 | 20-25 | 0.6-2.0 | 0.06-0.10 | 5.6-7.3 | Low---------- | 0.15 | 2 | .5-2 |
| | 3-31 | 27-35 | 0.6-2.0 | 0.06-0.10 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 31 | --- | --- | --- | --- | ---------- | ---- | | |
| Vitzthum--------- | 0-3 | 15-25 | 0.6-2.0 | 0.06-0.07 | 6.1-7.3 | Low---------- | 0.10 | 1 | 1-2 |
| | 3-17 | 20-30 | 0.6-2.0 | 0.04-0.07 | 5.6-7.3 | Low---------- | 0.10 | | |
| | 17-21 | --- | --- | --- | --- | ---------- | ---- | | |
| 173: | | | | | | | | | |
| Marpa Variant---- | 0-10 | 27-30 | 0.2-0.6 | 0.14-0.17 | 5.1-5.5 | Moderate------- | 0.15 | 2 | 1-2 |
| | 10-19 | 30-35 | 0.2-0.6 | 0.09-0.11 | 5.6-6.0 | Moderate------- | 0.10 | | |
| | 19-36 | 40-50 | 0.06-0.2 | 0.07-0.09 | 5.6-6.0 | Moderate------- | 0.10 | | |
| | 36-40 | --- | --- | --- | --- | ---------- | ---- | | |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors | | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | K | T | |
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 173: | | | | | | | | | |
| Goulding-------- | 0-6 | 20-27 | 0.6-2.0 | 0.11-0.13 | 5.1-6.5 | Low---------- | 0.10 | 1 | 1-2 |
| | 6-13 | 20-30 | 0.6-2.0 | 0.05-0.12 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 13 | --- | --- | --- | --- | ---------- | ---- | | |
| Holkat Variant-- | 0-11 | 27-30 | 0.6-2.0 | 0.15-0.19 | 6.1-7.3 | Moderate------- | 0.32 | 2 | 2-3 |
| | 11-23 | 18-30 | 0.6-2.0 | 0.11-0.14 | 6.1-7.3 | Low---------- | 0.24 | | |
| | 23 | --- | --- | --- | --- | ---------- | ---- | | |
| 175---------- | 0-11 | 20-27 | 0.6-2.0 | 0.14-0.17 | 5.6-7.3 | Low---------- | 0.37 | 1 | .5-3 |
| Millsholm | 11 | --- | --- | --- | --- | ---------- | ---- | | |
| 176: | | | | | | | | | |
| Millsholm------- | 0-11 | 20-27 | 0.6-2.0 | 0.14-0.17 | 5.6-7.3 | Low---------- | 0.37 | 1 | .5-3 |
| | 11 | --- | --- | --- | --- | ---------- | ---- | | |
| Azule----------- | 0-4 | 27-35 | 0.2-0.6 | 0.15-0.19 | 5.6-7.3 | Moderate------- | 0.32 | 2 | 1-2 |
| | 4-36 | 40-60 | 0.06-0.2 | 0.12-0.15 | 5.6-7.3 | High---------- | 0.24 | | |
| | 36 | --- | --- | --- | --- | ---------- | ---- | | |
| 177---------- | 0-5 | 10-13 | 2.0-6.0 | 0.09-0.12 | 5.1-6.5 | Low---------- | 0.24 | 4 | 1-3 |
| Minersville | 5-30 | 10-17 | 2.0-6.0 | 0.07-0.11 | 5.1-6.5 | Low---------- | 0.20 | | |
| | 30-43 | 5-11 | 2.0-6.0 | 0.05-0.09 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 43-47 | --- | --- | --- | --- | ---------- | ---- | | |
| 178: | | | | | | | | | |
| Minersville Variant-------- | 0-9 | 0-10 | 6.0-20 | 0.05-0.07 | 5.1-6.0 | Low---------- | 0.15 | 3 | 1-4 |
| | 9-34 | 0-10 | 6.0-20 | 0.03-0.05 | 5.1-6.0 | Low---------- | 0.10 | | |
| | 34-38 | --- | --- | --- | --- | ---------- | ---- | | |
| Choop----------- | 0-12 | 2-5 | 6.0-20 | 0.03-0.06 | 5.1-6.0 | Low---------- | 0.10 | 1 | 1-2 |
| | 12 | --- | --- | --- | --- | ---------- | ---- | | |
| 179, 180--------- | 0-5 | 25-27 | 0.2-0.6 | 0.14-0.17 | 6.1-7.3 | Low---------- | 0.20 | 3 | 2-3 |
| Musserhill | 5-11 | 27-35 | 0.2-0.6 | 0.10-0.13 | 6.1-7.3 | Moderate------- | 0.10 | | |
| | 11-32 | 27-35 | 0.2-0.6 | 0.05-0.08 | 6.1-7.3 | Moderate------- | 0.10 | | |
| | 32-36 | --- | --- | --- | --- | ---------- | ---- | | |
| 181: | | | | | | | | | |
| Musserhill------ | 0-5 | 25-27 | 0.2-0.6 | 0.14-0.17 | 6.1-7.3 | Low---------- | 0.20 | 3 | 2-3 |
| | 5-11 | 27-35 | 0.2-0.6 | 0.10-0.13 | 6.1-7.3 | Moderate------- | 0.10 | | |
| | 11-32 | 27-35 | 0.2-0.6 | 0.05-0.08 | 6.1-7.3 | Moderate------- | 0.10 | | |
| | 32-36 | --- | --- | --- | --- | ---------- | ---- | | |
| Weaverville----- | 0-4 | 27-30 | 0.2-0.6 | 0.15-0.19 | 6.1-7.3 | Moderate------- | 0.24 | 5 | 2-4 |
| | 4-56 | 25-35 | 0.2-0.6 | 0.10-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |
| | 56-81 | 27-35 | 0.2-0.6 | 0.09-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |
| 182: | | | | | | | | | |
| Musserhill------ | 0-5 | 25-27 | 0.2-0.6 | 0.14-0.17 | 6.1-7.3 | Low---------- | 0.20 | 3 | 2-3 |
| | 5-11 | 27-35 | 0.2-0.6 | 0.10-0.13 | 6.1-7.3 | Moderate------- | 0.10 | | |
| | 11-32 | 27-35 | 0.2-0.6 | 0.05-0.08 | 6.1-7.3 | Moderate------- | 0.10 | | |
| | 32-36 | --- | --- | --- | --- | ---------- | ---- | | |
| Weaverville----- | 0-4 | 20-27 | 0.6-2.0 | 0.13-0.17 | 6.1-7.3 | Low---------- | 0.24 | 5 | 2-4 |
| | 4-56 | 25-35 | 0.2-0.6 | 0.10-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |
| | 56-81 | 27-35 | 0.2-0.6 | 0.09-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors | | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | K | T | |
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 183: | | | | | | | | | |
| Musserhill------ | 0-5 | 25-27 | 0.2-0.6 | 0.14-0.17 | 6.1-7.3 | Low---------- | 0.20 | 3 | 2-3 |
| | 5-11 | 27-35 | 0.2-0.6 | 0.10-0.13 | 6.1-7.3 | Moderate------- | 0.10 | | |
| | 11-32 | 27-35 | 0.2-0.6 | 0.05-0.08 | 6.1-7.3 | Moderate------- | 0.10 | | |
| | 32-36 | --- | --- | --- | --- | ---------- | ---- | | |
| Weaverville----- | 0-4 | 27-30 | 0.2-0.6 | 0.15-0.19 | 6.1-7.3 | Moderate------- | 0.24 | 5 | 2-4 |
| | 4-56 | 25-35 | 0.2-0.6 | 0.10-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |
| | 56-81 | 27-35 | 0.2-0.6 | 0.09-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |
| Urban land. | | | | | | | | | |
| 184---------- | 0-4 | 20-27 | 0.6-2.0 | 0.13-0.16 | 6.1-6.5 | Low---------- | 0.28 | 3 | 1-2 |
| Musserhill | 4-13 | 27-40 | 0.2-0.6 | 0.14-0.18 | 5.1-6.5 | Low---------- | 0.20 | | |
| Variant | 13-32 | 35-55 | 0.06-0.2 | 0.08-0.10 | 5.1-6.5 | Moderate------- | 0.10 | | |
| | 32-36 | --- | --- | --- | --- | ---------- | ---- | | |
| 185: | | | | | | | | | |
| Pardaloe-------- | 0-15 | 15-25 | 2.0-6.0 | 0.09-0.12 | 5.6-6.5 | Low---------- | 0.20 | 5 | .5-2 |
| | 15-60 | 15-27 | 0.6-2.0 | 0.06-0.08 | 5.6-6.5 | Low---------- | 0.05 | | |
| Dedrick--------- | 0-3 | 15-25 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | 1 | 1-2 |
| | 3-15 | 14-27 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | | |
| | 15-19 | --- | --- | --- | --- | ---------- | ---- | | |
| 186: | | | | | | | | | |
| Pardaloe-------- | 0-6 | 15-25 | 2.0-6.0 | 0.06-0.10 | 5.6-6.5 | Low---------- | 0.15 | 5 | .5-2 |
| | 6-60 | 15-27 | 0.6-2.0 | 0.06-0.08 | 5.6-6.5 | Low---------- | 0.05 | | |
| Goulding-------- | 0-6 | 20-27 | 0.6-2.0 | 0.11-0.13 | 5.1-6.5 | Low---------- | 0.10 | 1 | 1-2 |
| | 6-13 | 20-30 | 0.6-2.0 | 0.05-0.12 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 13 | --- | --- | --- | --- | ---------- | ---- | | |
| 188. | | | | | | | | | |
| Rock outcrop | | | | | | | | | |
| 189: | | | | | | | | | |
| Rock outcrop. | | | | | | | | | |
| Dedrick--------- | 0-3 | 15-25 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | 1 | 1-2 |
| | 3-15 | 14-27 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | | |
| | 15-19 | --- | --- | --- | --- | ---------- | ---- | | |
| 190---------- | 0-4 | 10-25 | 0.6-2.0 | 0.05-0.07 | 5.1-6.0 | Low---------- | 0.10 | 2 | 1-2 |
| Sheetiron | 4-19 | 12-25 | 0.6-2.0 | 0.05-0.10 | 5.1-6.0 | Low---------- | 0.15 | | |
| | 19-24 | 12-25 | 0.6-2.0 | 0.04-0.07 | 5.1-6.0 | Low---------- | 0.10 | | |
| | 24 | --- | --- | --- | --- | ---------- | ---- | | |
| 191: | | | | | | | | | |
| Sheetiron------- | 0-4 | 10-25 | 0.6-2.0 | 0.07-0.10 | 5.1-6.0 | Low---------- | 0.15 | 2 | 1-2 |
| | 4-19 | 12-25 | 0.6-2.0 | 0.05-0.10 | 5.1-6.0 | Low---------- | 0.15 | | |
| | 19-24 | 12-25 | 0.6-2.0 | 0.04-0.07 | 5.1-6.0 | Low---------- | 0.10 | | |
| | 24 | --- | --- | --- | --- | ---------- | ---- | | |
| Barpeak--------- | 0-3 | 18-25 | 0.6-2.0 | 0.06-0.08 | 6.1-6.5 | Low---------- | 0.10 | 5 | 2-3 |
| | 3-8 | 18-25 | 0.6-2.0 | 0.05-0.06 | 5.6-7.3 | Low---------- | 0.10 | | |
| | 8-61 | 18-25 | 0.6-2.0 | 0.02-0.05 | 5.6-7.3 | Low---------- | 0.10 | | |
| 192: | | | | | | | | | |
| Sheetiron | | | | | | | | | |
| Variant-------- | 0-2 | 20-27 | 0.6-2.0 | 0.11-0.14 | 6.1-6.5 | Low---------- | 0.24 | 2 | 1-2 |
| | 2-18 | 27-35 | 0.6-2.0 | 0.12-0.15 | 5.6-6.0 | Low---------- | 0.15 | | |
| | 18-31 | 30-37 | 0.2-0.6 | 0.08-0.10 | 5.6-6.0 | Low---------- | 0.10 | | |
| | 31-35 | --- | --- | --- | --- | ---------- | ---- | | |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors | | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | K | T | |
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 192: | | | | | | | | | |
| Dedrick--------- | 0-3 | 15-25 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | 1 | 1-2 |
| | 3-15 | 14-27 | 0.6-2.0 | 0.04-0.06 | 6.1-7.3 | Low---------- | 0.05 | | |
| | 15-19 | --- | --- | --- | --- | ---------- | ---- | | |
| 193---------- | 0-4 | 18-25 | 0.6-2.0 | 0.04-0.05 | 5.6-6.5 | Low---------- | 0.05 | 1 | 1-2 |
| Skyrock | 4-10 | 18-25 | 0.6-2.0 | 0.06-0.08 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 10-18 | 18-25 | 0.6-2.0 | 0.05-0.06 | 5.1-6.5 | Low---------- | 0.05 | | |
| | 18-22 | --- | --- | --- | --- | ---------- | ---- | | |
| 194: | | | | | | | | | |
| Skyrock--------- | 0-4 | 18-25 | 0.6-2.0 | 0.04-0.05 | 5.6-6.5 | Low---------- | 0.05 | 1 | 1-2 |
| | 4-18 | 18-25 | 0.6-2.0 | 0.05-0.06 | 5.1-6.5 | Low---------- | 0.05 | | |
| | 18 | --- | --- | --- | --- | ---------- | ---- | | |
| Rock outcrop. | | | | | | | | | |
| 195: | | | | | | | | | |
| Skyrock Variant- | 0-3 | 20-25 | 0.6-2.0 | 0.08-0.11 | 5.1-5.5 | Low---------- | 0.15 | 1 | 2-3 |
| | 3-13 | 25-30 | 0.6-2.0 | 0.06-0.07 | 5.6-6.0 | Low---------- | 0.10 | | |
| | 13-17 | --- | --- | --- | --- | ---------- | ---- | | |
| Rock outcrop. | | | | | | | | | |
| 196: | | | | | | | | | |
| Skyrock Variant- | 0-3 | 20-25 | 0.6-2.0 | 0.08-0.11 | 5.1-5.5 | Low---------- | 0.15 | 1 | 2-3 |
| | 3-13 | 25-30 | 0.6-2.0 | 0.06-0.07 | 5.6-6.0 | Low---------- | 0.10 | | |
| | 13-17 | --- | --- | --- | --- | ---------- | ---- | | |
| Rock outcrop. | | | | | | | | | |
| Rubble land. | | | | | | | | | |
| 197: | | | | | | | | | |
| Springgulch----- | 0-7 | 27-35 | 0.6-2.0 | 0.15-0.16 | 6.1-7.3 | Low---------- | 0.17 | 5 | 2-4 |
| | 7-50 | 35-45 | 0.2-0.6 | 0.12-0.15 | 5.6-7.3 | Low---------- | 0.17 | | |
| | 50-75 | 35-45 | 0.2-0.6 | 0.10-0.13 | 5.6-7.3 | Low---------- | 0.10 | | |
| Brockgulch | | | | | | | | | |
| Variant-------- | 0-2 | 22-26 | 0.6-2.0 | 0.13-0.16 | 6.1-7.3 | Low---------- | 0.28 | 2 | 1-2 |
| | 2-5 | 27-30 | 0.6-2.0 | 0.12-0.15 | 5.6-7.3 | Low---------- | 0.15 | | |
| | 5-31 | 20-30 | 0.6-2.0 | 0.08-0.13 | 5.6-7.3 | Low---------- | 0.15 | | |
| | 31-35 | --- | --- | --- | --- | ---------- | ---- | | |
| 198, 199: | | | | | | | | | |
| Tallowbox------- | 0-9 | 8-10 | 2.0-6.0 | 0.07-0.10 | 5.6-6.5 | Low---------- | 0.15 | 2 | 1-3 |
| | 9-23 | 10-15 | 2.0-6.0 | 0.07-0.09 | 5.1-6.5 | Low---------- | 0.28 | | |
| | 23 | --- | --- | --- | --- | ---------- | ---- | | |
| Minersville----- | 0-5 | 10-13 | 2.0-6.0 | 0.09-0.12 | 5.1-6.5 | Low---------- | 0.24 | 4 | 1-3 |
| | 5-30 | 10-17 | 2.0-6.0 | 0.07-0.11 | 5.1-6.5 | Low---------- | 0.20 | | |
| | 30-43 | 5-11 | 2.0-6.0 | 0.05-0.09 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 43-47 | --- | --- | --- | --- | ---------- | ---- | | |
| 201: | | | | | | | | | |
| Urban land. | | | | | | | | | |
| Xeralfs--------- | 0-1 | 27-35 | 0.2-0.6 | 0.08-0.10 | 6.1-6.5 | Low---------- | 0.10 | --- | .5-1 |
| | 1-30 | 15-35 | 0.2-6.0 | 0.05-0.14 | 5.6-6.5 | Low---------- | 0.05 | | |
| | 30-34 | --- | --- | --- | --- | ---------- | ---- | | |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors | | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | K | T | |
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 202: | | | | | | | | | |
| Valcreek-------- | 0-3 | 3-8 | 6.0-20 | 0.04-0.05 | 5.1-6.0 | Low---------- | 0.10 | 2 | 1-2 |
| | 3-16 | 2-6 | 6.0-20 | 0.04-0.05 | 4.5-6.0 | Low---------- | 0.10 | | |
| | 16-31 | 2-6 | 6.0-20 | 0.03-0.04 | 4.5-6.0 | Low---------- | 0.05 | | |
| | 31-35 | --- | --- | --- | --- | ---------- | ---- | | |
| Choop----------- | 0-5 | 2-5 | 6.0-20 | 0.03-0.06 | 5.1-6.0 | Low---------- | 0.10 | 1 | 1-2 |
| | 5-16 | 2-5 | 6.0-20 | 0.02-0.03 | 5.6-6.5 | Low---------- | 0.05 | | |
| | 16-20 | --- | --- | --- | --- | ---------- | ---- | | |
| 203: | | | | | | | | | |
| Valcreek-------- | 0-3 | 3-8 | 6.0-20 | 0.04-0.05 | 5.1-6.0 | Low---------- | 0.10 | 2 | 1-2 |
| | 3-16 | 2-6 | 6.0-20 | 0.04-0.05 | 4.5-6.0 | Low---------- | 0.10 | | |
| | 16-31 | 2-6 | 6.0-20 | 0.03-0.04 | 4.5-6.0 | Low---------- | 0.05 | | |
| | 31-35 | --- | --- | --- | --- | ---------- | ---- | | |
| Minersville----- | 0-5 | 10-13 | 2.0-6.0 | 0.09-0.12 | 5.1-6.5 | Low---------- | 0.24 | 4 | 1-3 |
| | 5-30 | 10-17 | 2.0-6.0 | 0.07-0.11 | 5.1-6.5 | Low---------- | 0.20 | | |
| | 30-43 | 5-11 | 2.0-6.0 | 0.05-0.09 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 43-47 | --- | --- | --- | --- | ---------- | ---- | | |
| 204: | | | | | | | | | |
| Valcreek-------- | 0-3 | 3-8 | 6.0-20 | 0.04-0.05 | 5.1-6.0 | Low---------- | 0.10 | 2 | 1-2 |
| | 3-16 | 2-6 | 6.0-20 | 0.04-0.05 | 4.5-6.0 | Low---------- | 0.10 | | |
| | 16-31 | 2-6 | 6.0-20 | 0.03-0.04 | 4.5-6.0 | Low---------- | 0.05 | | |
| | 31-35 | --- | --- | --- | --- | ---------- | ---- | | |
| Minersville----- | 0-5 | 10-13 | 2.0-6.0 | 0.09-0.12 | 5.1-6.5 | Low---------- | 0.24 | 4 | 1-3 |
| | 5-30 | 10-17 | 2.0-6.0 | 0.07-0.11 | 5.1-6.5 | Low---------- | 0.20 | | |
| | 30-43 | 5-11 | 2.0-6.0 | 0.05-0.09 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 43-47 | --- | --- | --- | --- | ---------- | ---- | | |
| Choop----------- | 0-5 | 2-5 | 6.0-20 | 0.03-0.06 | 5.1-6.0 | Low---------- | 0.10 | 1 | 1-2 |
| | 5-16 | 2-5 | 6.0-20 | 0.02-0.03 | 5.6-6.5 | Low---------- | 0.05 | | |
| | 16-20 | --- | --- | --- | --- | ---------- | ---- | | |
| 205, 206: | | | | | | | | | |
| Vanvor---------- | 0-6 | 23-25 | 0.6-2.0 | 0.08-0.11 | 6.1-7.3 | Low---------- | 0.10 | 2 | 1-2 |
| | 6-24 | 25-35 | 0.6-2.0 | 0.08-0.10 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 24-31 | 25-35 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 31-35 | --- | --- | --- | --- | ---------- | ---- | | |
| Hoosimbim------- | 0-4 | 15-20 | 0.6-2.0 | 0.03-0.04 | 5.6-6.5 | Low---------- | 0.10 | 3 | 1-2 |
| | 4-16 | 25-35 | 0.6-2.0 | 0.08-0.10 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 16-42 | 25-35 | 0.6-2.0 | 0.04-0.05 | 5.1-6.5 | Low---------- | 0.10 | | |
| | 42-46 | --- | --- | --- | --- | ---------- | ---- | | |
| 207: | | | | | | | | | |
| Vitzthum-------- | 0-6 | 15-25 | 0.6-2.0 | 0.07-0.08 | 6.1-7.3 | Low---------- | 0.10 | 1 | 1-2 |
| | 6-18 | 20-30 | 0.6-2.0 | 0.04-0.07 | 5.6-7.3 | Low---------- | 0.10 | | |
| | 18 | --- | --- | --- | --- | ---------- | ---- | | |
| Cargent--------- | 0-3 | 20-25 | 0.6-2.0 | 0.08-0.11 | 6.1-7.3 | Low---------- | 0.15 | 2 | 1-2 |
| | 3-21 | 20-30 | 0.6-2.0 | 0.09-0.11 | 6.1-7.3 | Low---------- | 0.15 | | |
| | 21-32 | 20-30 | 0.6-2.0 | 0.05-0.06 | 6.1-7.3 | Low---------- | 0.10 | | |
| | 32-36 | --- | --- | --- | --- | ---------- | ---- | | |
| 208, 209--------- | 0-4 | 20-27 | 0.6-2.0 | 0.13-0.17 | 6.1-7.3 | Low---------- | 0.24 | 5 | 2-4 |
| Weaverville | 4-56 | 25-35 | 0.2-0.6 | 0.10-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |
| | 56-81 | 27-35 | 0.2-0.6 | 0.09-0.13 | 5.1-7.3 | Moderate------- | 0.15 | | |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors | | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | K | T | |
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 210: | | | | | | | | | |
| Weitchpec------- | 0-10 | 20-25 | 0.6-2.0 | 0.10-0.14 | 6.1-7.3 | Low---------- | 0.24 | 2 | 1-3 |
| | 10-29 | 15-25 | 0.6-2.0 | 0.04-0.09 | 6.1-7.3 | Low---------- | 0.15 | | |
| | 29 | --- | --- | --- | --- | ---------- | ---- | | |
| Dubakella------- | 0-5 | 27-35 | 0.2-0.6 | 0.11-0.15 | 5.6-7.3 | Moderate------- | 0.20 | 2 | 4-10 |
| | 5-34 | 35-50 | 0.06-0.2 | 0.08-0.10 | 6.1-7.8 | Moderate------- | 0.10 | | |
| | 34 | --- | --- | --- | --- | ---------- | ---- | | |
| 211: | | | | | | | | | |
| Weitchpec Variant-------- | 0-9 | 20-25 | 0.6-2.0 | 0.11-0.14 | 6.1-6.5 | Low---------- | 0.24 | 3 | 2-3 |
| | 9-30 | 35-40 | 0.2-0.6 | 0.09-0.13 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 30-48 | 30-40 | 0.2-0.6 | 0.03-0.05 | 6.1-6.5 | Low---------- | 0.10 | | |
| | 48-52 | --- | --- | --- | --- | ---------- | ---- | | |
| Bamtush Variant very gravelly loam---------- | 0-6 | 18-25 | 0.6-2.0 | 0.08-0.11 | 6.6-7.8 | Low---------- | 0.10 | 5 | 3-4 |
| | 6-15 | 20-27 | 0.6-2.0 | 0.08-0.09 | 6.6-7.8 | Low---------- | 0.10 | | |
| | 15-69 | 27-35 | 0.6-2.0 | 0.07-0.09 | 6.6-7.8 | Moderate------- | 0.10 | | |
| | 69-78 | 40-50 | 0.2-0.6 | 0.07-0.09 | 6.6-7.8 | Moderate------- | 0.10 | | |
| Bamtush Variant loam---------- | 0-6 | 18-25 | 0.6-2.0 | 0.13-0.16 | 6.6-7.8 | Low---------- | 0.32 | 5 | 3-4 |
| | 6-15 | 20-27 | 0.6-2.0 | 0.08-0.09 | 6.6-7.8 | Low---------- | 0.10 | | |
| | 15-69 | 27-35 | 0.6-2.0 | 0.07-0.09 | 6.6-7.8 | Moderate------- | 0.10 | | |
| | 69-78 | 40-50 | 0.2-0.6 | 0.07-0.09 | 6.6-7.8 | Moderate------- | 0.10 | | |
| 212: | | | | | | | | | |
| Weitchpec Variant-------- | 0-9 | 20-25 | 0.6-2.0 | 0.11-0.14 | 6.1-6.5 | Low---------- | 0.24 | 3 | 2-3 |
| | 9-30 | 35-40 | 0.2-0.6 | 0.09-0.13 | 5.1-6.5 | Low---------- | 0.15 | | |
| | 30-48 | 30-40 | 0.2-0.6 | 0.03-0.05 | 6.1-6.5 | Low---------- | 0.10 | | |
| | 48-52 | --- | --- | --- | --- | ---------- | ---- | | |
| Bamtush Variant- | 0-6 | 18-25 | 0.6-2.0 | 0.08-0.11 | 6.6-7.8 | Low---------- | 0.10 | 5 | 3-4 |
| | 6-15 | 20-27 | 0.6-2.0 | 0.08-0.09 | 6.6-7.8 | Low---------- | 0.10 | | |
| | 15-69 | 27-35 | 0.6-2.0 | 0.07-0.09 | 6.6-7.8 | Moderate------- | 0.10 | | |
| | 69-78 | 40-50 | 0.2-0.6 | 0.07-0.09 | 6.6-7.8 | Moderate------- | 0.10 | | |
| 213: | | | | | | | | | |
| Xeralfs--------- | 0-1 | 27-35 | 0.2-0.6 | 0.08-0.10 | 6.1-6.5 | Low---------- | 0.10 | --- | .5-1 |
| | 1-30 | 15-35 | 0.2-6.0 | 0.05-0.14 | 5.6-6.5 | Low---------- | 0.05 | | |
| | 30-34 | --- | --- | --- | --- | ---------- | ---- | | |
| Xerorthents----- | 0-4 | 27-35 | 0.2-0.6 | 0.07-0.09 | 6.6-7.8 | Low---------- | 0.10 | --- | 0-.5 |
| | 4-12 | 10-18 | 0.6-2.0 | 0.05-0.07 | 6.6-7.8 | Low---------- | 0.05 | | |
| | 12-16 | --- | --- | --- | --- | ---------- | ---- | | |
| 215-------------- | 0-3 | 30-40 | 0.2-0.6 | 0.16-0.18 | 6.1-7.3 | High---------- | 0.17 | 4 | 1-3 |
| Xererts | 3-60 | 35-75 | 0.00-0.06 | 0.12-0.15 | 6.6-8.4 | High---------- | 0.24 | | |
| 216: | | | | | | | | | |
| Xererts--------- | 0-3 | 30-40 | 0.2-0.6 | 0.16-0.18 | 6.1-7.3 | High---------- | 0.17 | 4 | 1-3 |
| | 3-60 | 35-75 | 0.00-0.06 | 0.12-0.15 | 6.6-8.4 | High---------- | 0.24 | | |
| Haysum---------- | 0-15 | 20-25 | 0.6-2.0 | 0.14-0.16 | 6.1-7.3 | Low---------- | 0.37 | 5 | 2-3 |
| | 15-60 | 25-35 | 0.6-2.0 | 0.11-0.16 | 6.1-6.5 | Low---------- | 0.17 | | |
| 217: | | | | | | | | | |
| Xerofluvents---- | 0-5 | 0-5 | 6.0-20 | 0.04-0.06 | 6.6-7.3 | Low---------- | 0.05 | 5 | 0-.5 |
| | 5-60 | 0-10 | 2.0-20 | 0.03-0.07 | 6.1-7.3 | Low---------- | 0.02 | | |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors | | Organic matter |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | K | T | |
| | In | Pct | In/hr | In/in | pH | | | | Pct |
| 217: | | | | | | | | | |
| Riverwash------- | 0-5 | 0-5 | 6.0-20 | 0.04-0.06 | 6.6-7.3 | Low---------- | 0.05 | 5 | 0-.5 |
| | 5-60 | 0-10 | 2.0-20 | 0.03-0.07 | 6.1-7.3 | Low---------- | 0.02 | | |
| 218, 219: | | | | | | | | | |
| Xerorthents----- | 0-4 | 27-35 | 0.2-0.6 | 0.07-0.09 | 6.6-7.8 | Low---------- | 0.10 | --- | 0-.5 |
| | 4-12 | 10-18 | 0.6-2.0 | 0.05-0.07 | 6.6-7.8 | Low---------- | 0.05 | | |
| | 12-16 | --- | --- | --- | --- | ---------- | ---- | | |
| Rock outcrop. | | | | | | | | | |

TABLE 15.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "frequent," "brief," and "apparent" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

| Soil name and map symbol | Hydrologic group | Flooding | | High water table | | | Bedrock | | Risk of corrosion | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | Duration | Depth | Kind | Months | Depth | Hardness | Uncoated steel | Concrete |
| | | | | Ft | | | In | | | |
| 101--- Atter | A | None--- | --- | >6.0 | --- | --- | >60 | --- | Moderate--- | Moderate. |
| 102: | | | | | | | | | | |
| Atter--- | A | None--- | --- | >6.0 | --- | --- | >60 | --- | Moderate--- | Moderate. |
| Dumps--- | A | Occasional | Brief--- | >6.0 | --- | --- | 14-60 | Hard | Low--- | Low. |
| Xerofluvents--- | A | Frequent--- | Brief--- | >6.0 | --- | --- | 14-60 | Hard | Low--- | Low. |
| 103, 104: | | | | | | | | | | |
| Bamtush--- | B | None--- | --- | >6.0 | --- | --- | >60 | --- | Moderate--- | Moderate. |
| Brownbear--- | B | None--- | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate--- | Moderate. |
| 105: | | | | | | | | | | |
| Bamtush--- | B | None--- | --- | >6.0 | --- | --- | >60 | --- | Moderate--- | Moderate. |
| Brownbear--- | B | None--- | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate--- | Moderate. |
| Weaverville--- | B | None--- | --- | >6.0 | --- | --- | >60 | --- | High--- | Moderate. |
| 106: | | | | | | | | | | |
| Bamtush--- | B | None--- | --- | >6.0 | --- | --- | >60 | --- | Moderate--- | Moderate. |
| Weaverville--- | B | None--- | --- | >6.0 | --- | --- | >60 | --- | High--- | Moderate. |
| 107: | | | | | | | | | | |
| Bamtush--- | B | None--- | --- | >6.0 | --- | --- | >60 | --- | Moderate--- | Moderate. |
| Weaverville--- | B | None--- | --- | >6.0 | --- | --- | >60 | --- | High--- | Moderate. |
| Brownbear--- | B | None--- | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate--- | Moderate. |
| 109: | | | | | | | | | | |
| Barpeak--- | B | None--- | --- | >6.0 | --- | --- | >60 | --- | Low--- | Low. |
| Sheetiron--- | B | None--- | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate--- | Moderate. |
| 110: | | | | | | | | | | |
| Beargulch--- | B | None--- | --- | >6.0 | --- | --- | 40-60 | Hard | Low--- | Low. |
| Skyrock--- | D | None--- | --- | >6.0 | --- | --- | 10-20 | Hard | Low--- | Low. |
| 111: | | | | | | | | | | |
| Brockgulch--- | B | None--- | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate--- | Low. |
| Dedrick--- | D | None--- | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate--- | Low. |
| Brownbear--- | B | None--- | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate--- | Moderate. |
| 112: | | | | | | | | | | |
| Brownbear--- | B | None--- | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate--- | Moderate. |
| Bamtush--- | B | None--- | --- | >6.0 | --- | --- | >60 | --- | Moderate--- | Moderate. |

TABLE 15.--SOIL AND WATER FEATURES--Continued

| Soil name and map symbol | Hydrologic group | Flooding | | High water table | | | Bedrock | | Risk of corrosion | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | Duration | Depth | Kind | Months | Depth | Hardness | Uncoated steel | Concrete |
| | | | | Ft | | | In | | | |
| 113, 114----------<br>Brownscreek | B | None--------- | --- | >6.0 | --- | --- | 20-40 | Hard | Low--------- | Low. |
| 115:<br>Brownscreek------ | B | None--------- | --- | >6.0 | --- | --- | 20-40 | Hard | Low--------- | Low. |
| Dedrick---------- | D | None--------- | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate--- | Low. |
| 116, 117:<br>Brownscreek------ | B | None--------- | --- | >6.0 | --- | --- | 20-40 | Hard | Low--------- | Low. |
| Dougcity--------- | B | None--------- | --- | >6.0 | --- | --- | >60 | --- | Low--------- | Low. |
| 118, 119:<br>Cargent---------- | B | None--------- | --- | >6.0 | --- | --- | 20-40 | Hard | Low--------- | Low. |
| Demogul---------- | B | None--------- | --- | >6.0 | --- | --- | >60 | --- | Low--------- | Low. |
| 120, 121----------<br>Caris | B | None--------- | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate--- | Moderate. |
| 122:<br>Caris---------- | B | None--------- | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate--- | Moderate. |
| Indleton--------- | B | None--------- | --- | >6.0 | --- | --- | >60 | --- | Low--------- | Low. |
| Hoosimbim-------- | B | None--------- | --- | >6.0 | --- | --- | 40-60 | Hard | Moderate--- | Moderate. |
| 123, 124----------<br>Carrcreek | B | None--------- | --- | >6.0 | --- | --- | >60 | --- | Moderate--- | Low. |
| 125----------<br>Choop | D | None--------- | --- | >6.0 | --- | --- | 10-20 | Soft | Moderate--- | Moderate. |
| 126:<br>Choop---------- | D | None--------- | --- | >6.0 | --- | --- | 10-20 | Soft | Moderate--- | Moderate. |
| Rock outcrop. | | | | | | | | | | |
| 127, 128, 129-----<br>Crefork | C | None--------- | --- | >6.0 | --- | --- | >60 | --- | Moderate--- | Moderate. |
| 131:<br>Crefork---------- | C | None--------- | --- | >6.0 | --- | --- | >60 | --- | Moderate--- | Moderate. |
| Musserhill------- | C | None--------- | --- | >6.0 | --- | --- | 20-40 | Soft | Moderate--- | Low. |
| 132----------<br>Dedrick | D | None--------- | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate--- | Low. |
| 133:<br>Dedrick---------- | D | None--------- | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate--- | Low. |
| Rock outcrop. | | | | | | | | | | |
| 134----------<br>Demogul | B | None--------- | --- | >6.0 | --- | --- | >60 | --- | Low--------- | Low. |
| 136:<br>Dougcity--------- | B | None--------- | --- | >6.0 | --- | --- | >60 | --- | Low--------- | Low. |

TABLE 15.--SOIL AND WATER FEATURES--Continued

| Soil name and map symbol | Hydrologic group | Flooding | | High water table | | | Bedrock | | Risk of corrosion | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | Duration | Depth | Kind | Months | Depth | Hardness | Uncoated steel | Concrete |
| | | | | Ft | | | In | | | |
| 136: Dedrick | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Low. |
| 137: Dougcity | B | None | --- | >6.0 | --- | --- | >60 | --- | Low | Low. |
| Demogul | B | None | --- | >6.0 | --- | --- | >60 | --- | Low | Low. |
| 138, 139, 140, 141--Dubakella | C | None | --- | >6.0 | --- | --- | 20-40 | Hard | High | Moderate. |
| 142--Etsel | D | None | --- | >6.0 | --- | --- | 14-20 | Hard | Moderate | Moderate. |
| 143: Etsel | D | None | --- | >6.0 | --- | --- | 14-20 | Hard | Moderate | Moderate. |
| Bamtush | B | None | --- | >6.0 | --- | --- | >60 | --- | Moderate | Moderate. |
| 144: Etsel | D | None | --- | >6.0 | --- | --- | 14-20 | Hard | Moderate | Moderate. |
| Weitchpec | C | None | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate | Moderate. |
| 145: Goulding | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Moderate. |
| Holkat Variant | B | None | --- | >6.0 | --- | --- | 20-40 | Hard | Low | Low. |
| Marpa Variant | C | None | --- | >6.0 | --- | --- | 20-40 | Hard | High | Moderate. |
| 146: Goulding | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Moderate. |
| Vitzthum | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Low. |
| Vanvor | B | None | --- | >6.0 | --- | --- | 20-40 | Hard | Low | Low. |
| 147, 148--Haploxerolls | A | None | --- | >6.0 | --- | --- | >60 | --- | Low | Low. |
| 149, 150, 151, 152--Haysum | B | None | --- | >6.0 | --- | --- | >60 | --- | Moderate | Low. |
| 153, 154: Holkat | B | None | --- | >6.0 | --- | --- | 20-40 | Soft | Low | Low. |
| Hoosimbim | B | None | --- | >6.0 | --- | --- | 40-60 | Hard | Moderate | Moderate. |
| 155: Holkat Variant | B | None | --- | >6.0 | --- | --- | 20-40 | Hard | Low | Low. |
| Dedrick | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Low. |
| 156--Hoosimbim | B | None | --- | >6.0 | --- | --- | 40-60 | Soft | Moderate | Low. |
| 157: Hoosimbim | B | None | --- | >6.0 | --- | --- | 40-60 | Hard | Moderate | Moderate. |

TABLE 15.--SOIL AND WATER FEATURES--Continued

| Soil name and map symbol | Hydrologic group | Flooding | | High water table | | | Bedrock | | Risk of corrosion | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | Duration | Depth | Kind | Months | Depth | Hardness | Uncoated steel | Concrete |
| | | | | Ft | | | In | | | |
| 157: | | | | | | | | | | |
| Bamtush | B | None | --- | >6.0 | --- | --- | >60 | --- | Moderate | Moderate. |
| Marpa | C | None | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate | Moderate. |
| 158: | | | | | | | | | | |
| Hoosimbim | B | None | --- | >6.0 | --- | --- | 40-60 | Hard | Moderate | Moderate. |
| Etsel | D | None | --- | >6.0 | --- | --- | 14-20 | Hard | Moderate | Moderate. |
| 159: | | | | | | | | | | |
| Hoosimbim | B | None | --- | >6.0 | --- | --- | 40-60 | Hard | Moderate | Moderate. |
| Goulding | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Moderate. |
| 160, 161 Hotaw | B | None | --- | >6.0 | --- | --- | 20-40 | Soft | Moderate | Moderate. |
| 162: | | | | | | | | | | |
| Indleton | B | None | --- | >6.0 | --- | --- | >60 | --- | Low | Low. |
| Caris | B | None | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate | Moderate. |
| Hoosimbim | B | None | --- | >6.0 | --- | --- | 40-60 | Hard | Moderate | Moderate. |
| 163, 164, 165, 166 Jafa | B | None | --- | >6.0 | --- | --- | >60 | --- | Moderate | Moderate. |
| 167 Jafa | C | None | --- | >6.0 | --- | --- | >60 | --- | High | Low. |
| 170: | | | | | | | | | | |
| Marpa | C | None | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate | Moderate. |
| Hoosimbim | B | None | --- | >6.0 | --- | --- | 40-60 | Hard | Moderate | Moderate. |
| 171: | | | | | | | | | | |
| Marpa | C | None | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate | Moderate. |
| Hoosimbim | B | None | --- | >6.0 | --- | --- | 40-60 | Hard | Moderate | Moderate. |
| Bamtush | B | None | --- | >6.0 | --- | --- | >60 | --- | Moderate | Moderate. |
| 172: | | | | | | | | | | |
| Marpa | C | None | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate | Moderate. |
| Vitzthum | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Low. |
| 173: | | | | | | | | | | |
| Marpa Variant | C | None | --- | >6.0 | --- | --- | 20-40 | Hard | High | Moderate. |
| Goulding | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Moderate. |
| Holkat Variant | B | None | --- | >6.0 | --- | --- | 20-40 | Hard | Low | Low. |
| 175 Millsholm | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Moderate. |
| 176: | | | | | | | | | | |
| Millsholm | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Moderate. |

TABLE 15.--SOIL AND WATER FEATURES--Continued

| Soil name and map symbol | Hydrologic group | Flooding | | High water table | | | Bedrock | | Risk of corrosion | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | Duration | Depth | Kind | Months | Depth | Hardness | Uncoated steel | Concrete |
| | | | | Ft | | | In | | | |
| 176: | | | | | | | | | | |
| Azule | C | None | --- | >6.0 | --- | --- | 20-40 | Soft | Moderate | Moderate. |
| 177 Minersville | B | None | --- | >6.0 | --- | --- | 40-60 | Soft | Moderate | Moderate. |
| 178: | | | | | | | | | | |
| Minersville Variant | C | None | --- | >6.0 | --- | --- | 20-40 | Soft | Moderate | Moderate. |
| Choop | D | None | --- | >6.0 | --- | --- | 10-20 | Soft | Moderate | Moderate. |
| 179, 180 Musserhill | C | None | --- | >6.0 | --- | --- | 20-40 | Soft | Moderate | Low. |
| 181, 182: | | | | | | | | | | |
| Musserhill | C | None | --- | >6.0 | --- | --- | 20-40 | Soft | Moderate | Low. |
| Weaverville | B | None | --- | >6.0 | --- | --- | >60 | --- | High | Moderate. |
| 183: | | | | | | | | | | |
| Musserhill | C | None | --- | >6.0 | --- | --- | 20-40 | Soft | Moderate | Low. |
| Weaverville | B | None | --- | >6.0 | --- | --- | >60 | --- | High | Moderate. |
| Urban land. | | | | | | | | | | |
| 184 Musserhill Variant | C | None | --- | >6.0 | --- | --- | 20-40 | Soft | High | Low. |
| 185: | | | | | | | | | | |
| Pardaloe | B | None | --- | >6.0 | --- | --- | >60 | --- | Moderate | Moderate. |
| Dedrick | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Low. |
| 186: | | | | | | | | | | |
| Pardaloe | B | None | --- | >6.0 | --- | --- | >60 | --- | Moderate | Moderate. |
| Goulding | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Moderate. |
| 188 Rock outcrop | D | None | --- | >6.0 | --- | --- | 0 | Hard | --- | --- |
| 189: | | | | | | | | | | |
| Rock outcrop | D | None | --- | >6.0 | --- | --- | 0 | Hard | --- | --- |
| Dedrick | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Low. |
| 190 Sheetiron | B | None | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate | Moderate. |
| 191: | | | | | | | | | | |
| Sheetiron | B | None | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate | Moderate. |
| Barpeak | B | None | --- | >6.0 | --- | --- | >60 | --- | Low | Low. |
| 192: | | | | | | | | | | |
| Sheetiron Variant | C | None | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate | Low. |
| Dedrick | D | None | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate | Low. |

TABLE 15.--SOIL AND WATER FEATURES--Continued

| Soil name and map symbol | Hydrologic group | Flooding | | High water table | | | Bedrock | | Risk of corrosion | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | Duration | Depth | Kind | Months | Depth | Hardness | Uncoated steel | Concrete |
| | | | | Ft | | | In | | | |
| 193---------- Skyrock | D | None-------- | --- | >6.0 | --- | --- | 10-20 | Hard | Low-------- | Low. |
| 194: Skyrock---------- | D | None-------- | --- | >6.0 | --- | --- | 10-20 | Hard | Low-------- | Low. |
| Rock outcrop. | | | | | | | | | | |
| 195: Skyrock Variant-- | D | None-------- | --- | >6.0 | --- | --- | 10-20 | Hard | Low-------- | Moderate. |
| Rock outcrop----- | D | None-------- | --- | >6.0 | --- | --- | 0 | Hard | --- | --- |
| 196: Skyrock Variant-- | D | None-------- | --- | >6.0 | --- | --- | 10-20 | Hard | Low-------- | Moderate. |
| Rock outcrop. | | | | | | | | | | |
| Rubble land. | | | | | | | | | | |
| 197: Springgulch------ | B | None-------- | --- | >6.0 | --- | --- | >60 | --- | High------- | Moderate. |
| Brockgulch Variant--------- | B | None-------- | --- | >6.0 | --- | --- | 20-40 | Hard | Low-------- | Low. |
| 198, 199: Tallowbox-------- | C | None-------- | --- | >6.0 | --- | --- | 20-40 | Soft | Moderate--- | Moderate. |
| Minersville------ | B | None-------- | --- | >6.0 | --- | --- | 40-60 | Soft | Moderate--- | Moderate. |
| 201: Urban land. | | | | | | | | | | |
| Xeralfs---------- | A | None-------- | --- | >6.0 | --- | --- | 10-60 | Soft | Moderate--- | Moderate. |
| 202: Valcreek--------- | B | None-------- | --- | >6.0 | --- | --- | 20-40 | Soft | High------- | High. |
| Choop---------- | D | None-------- | --- | >6.0 | --- | --- | 10-20 | Soft | Moderate--- | Moderate. |
| 203: Valcreek--------- | B | None-------- | --- | >6.0 | --- | --- | 20-40 | Soft | High------- | High. |
| Minersville------ | B | None-------- | --- | >6.0 | --- | --- | 40-60 | Soft | Moderate--- | Moderate. |
| 204: Valcreek--------- | B | None-------- | --- | >6.0 | --- | --- | 20-40 | Soft | High------- | High. |
| Minersville------ | B | None-------- | --- | >6.0 | --- | --- | 40-60 | Soft | Moderate--- | Moderate. |
| Choop---------- | D | None-------- | --- | >6.0 | --- | --- | 10-20 | Soft | Moderate--- | Moderate. |
| 205, 206: Vanvor---------- | B | None-------- | --- | >6.0 | --- | --- | 20-40 | Hard | Low-------- | Low. |
| Hoosimbim-------- | B | None-------- | --- | >6.0 | --- | --- | 40-60 | Hard | Moderate--- | Moderate. |
| 207: Vitzthum--------- | D | None-------- | --- | >6.0 | --- | --- | 10-20 | Hard | Moderate--- | Low. |

TABLE 15.--SOIL AND WATER FEATURES--Continued

| Soil name and map symbol | Hydrologic group | Flooding | | High water table | | | Bedrock | | Risk of corrosion | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | Duration | Depth | Kind | Months | Depth | Hardness | Uncoated steel | Concrete |
| | | | | Ft | | | In | | | |
| 207: | | | | | | | | | | |
| Cargent---------- | B | None-------- | --- | >6.0 | --- | --- | 20-40 | Hard | Low-------- | Low. |
| 208, 209---------- Weaverville | B | None-------- | --- | >6.0 | --- | --- | >60 | --- | High------- | Moderate. |
| 210: | | | | | | | | | | |
| Weitchpec-------- | C | None-------- | --- | >6.0 | --- | --- | 20-40 | Hard | Moderate--- | Moderate. |
| Dubakella-------- | C | None-------- | --- | >6.0 | --- | --- | 20-40 | Hard | High------- | Moderate. |
| 211: | | | | | | | | | | |
| Weitchpec Variant | B | None-------- | --- | >6.0 | --- | --- | 40-60 | Hard | Low-------- | Low. |
| Bamtush Variant very gravelly loam---------- | B | None-------- | --- | >6.0 | --- | --- | >60 | --- | High------- | Low. |
| Bamtush Variant loam---------- | B | None-------- | --- | >6.0 | --- | --- | >60 | --- | High------- | Low. |
| 212: | | | | | | | | | | |
| Weitchpec Variant | B | None-------- | --- | >6.0 | --- | --- | 40-60 | Hard | Low-------- | Low. |
| Bamtush Variant-- | B | None-------- | --- | >6.0 | --- | --- | >60 | --- | High------- | Low. |
| 213: | | | | | | | | | | |
| Xeralfs---------- | A | None-------- | --- | >6.0 | --- | --- | 10-60 | Soft | Moderate--- | Moderate. |
| Xerorthents------ | A | None-------- | --- | >6.0 | --- | --- | 10-60 | Hard | Low-------- | Low. |
| 215---------- Xererts | D | None-------- | --- | >6.0 | --- | --- | 40-60 | Soft | High------- | Low. |
| 216: | | | | | | | | | | |
| Xererts---------- | D | None-------- | --- | >6.0 | --- | --- | 40-60 | Soft | High------- | Low. |
| Haysum----------- | B | None-------- | --- | >6.0 | --- | --- | >60 | --- | Moderate--- | Low. |
| 217: | | | | | | | | | | |
| Xerofluvents----- | A | Frequent---- | Brief----- | >6.0 | --- | --- | 14-60 | Hard | Low-------- | Low. |
| Riverwash-------- | D | Frequent---- | Long or very long. | 0-2.0 | Apparent | Jan-Dec | >60 | --- | --- | --- |
| 218, 219: | | | | | | | | | | |
| Xerorthents------ | A | None-------- | --- | >6.0 | --- | --- | 10-60 | Hard | Low-------- | Low. |
| Rock outcrop----- | D | None-------- | --- | >6.0 | --- | --- | 0 | Hard | --- | --- |

TABLE 16.--CLASSIFICATION OF THE SOILS

| Soil name | Family or higher taxonomic class |
|---|---|
| Atter | Sandy-skeletal, mixed, mesic Typic Xerorthents |
| Azule | Fine, montmorillonitic, thermic Mollic Haploxeralfs |
| Bamtush | Loamy-skeletal, mixed, mesic Ultic Palexeralfs |
| Bamtush Variant | Loamy-skeletal, oxidic, mesic Haplic Palexeralfs |
| Barpeak | Loamy-skeletal, mixed, mesic Dystric Xerochrepts |
| Beargulch | Loamy-skeletal, mixed, frigid Dystric Xerochrepts |
| Brockgulch | Loamy-skeletal, mixed, thermic Typic Xerochrepts |
| Brockgulch Variant | Loamy-skeletal, oxidic, thermic Mollic Haploxeralfs |
| Brownbear | Loamy-skeletal, mixed, mesic Typic Xerochrepts |
| Brownscreek | Loamy-skeletal, oxidic, mesic Ultic Haploxeralfs |
| Cargent | Loamy-skeletal, mixed, thermic Dystric Xerochrepts |
| Caris | Loamy-skeletal, mixed, mesic Typic Xerochrepts |
| Carrcreek | Loamy-skeletal, mixed, mesic Pachic Argixerolls |
| Choop | Sandy-skeletal, mixed, mesic, shallow Typic Xerorthents |
| Crefork | Fine, montmorillonitic, mesic Typic Palexeralfs |
| Dedrick | Loamy-skeletal, mixed, thermic Lithic Xerochrepts |
| Demogul | Fine-loamy, oxidic, mesic Ultic Palexeralfs |
| Dougcity | Loamy-skeletal, oxidic, mesic Ultic Palexeralfs |
| Dubakella | Clayey-skeletal, serpentinitic, mesic Mollic Haploxeralfs |
| Etsel | Loamy-skeletal, mixed, nonacid, mesic Lithic Xerorthents |
| Goulding | Loamy-skeletal, mixed, mesic Lithic Xerochrepts |
| Haploxerolls | Haploxerolls |
| Haysum | Fine-loamy, mixed, mesic Pachic Argixerolls |
| Holkat | Fine-loamy, mixed, mesic Dystric Xerochrepts |
| Holkat Variant | Fine-loamy, mixed, mesic Typic Xerochrepts |
| Hoosimbim | Loamy-skeletal, mixed, mesic Ultic Haploxeralfs |
| Hotaw | Fine-loamy, mixed, mesic Ultic Haploxeralfs |
| Indleton | Loamy-skeletal, mixed, mesic Typic Xerochrepts |
| Jafa | Fine-loamy, mixed, mesic Ultic Palexeralfs |
| Marpa | Loamy-skeletal, mixed, mesic Ultic Haploxeralfs |
| Marpa Variant | Clayey-skeletal, mixed, mesic Ultic Haploxeralfs |
| Millsholm | Loamy, mixed, thermic Lithic Xerochrepts |
| Minersville | Coarse-loamy, mixed, mesic Typic Xerochrepts |
| Minersville Variant | Sandy-skeletal, mixed, frigid Entic Xerumbrepts |
| Musserhill | Loamy-skeletal, oxidic, mesic Mollic Haploxeralfs |
| Musserhill Variant | Clayey-skeletal, mixed, thermic Mollic Haploxeralfs |
| Pardaloe | Loamy-skeletal, mixed, mesic Typic Xerochrepts |
| Sheetiron | Loamy-skeletal, mixed, mesic Dystric Xerochrepts |
| Sheetiron Variant | Fine-loamy, mixed, mesic Typic Haploxeralfs |
| Skyrock | Loamy-skeletal, mixed, frigid Dystric Lithic Xerochrepts |
| Skyrock Variant | Loamy-skeletal, mixed, frigid Dystric Lithic Xerochrepts |
| Springgulch | Fine, oxidic, thermic Haplic Palexeralfs |
| Tallowbox | Coarse-loamy, mixed, mesic Typic Xerochrepts |
| Valcreek | Sandy-skeletal, mixed, mesic Typic Xerorthents |
| Vanvor | Loamy-skeletal, mixed, mesic Mollic Haploxeralfs |
| Vitzthum | Loamy-skeletal, mixed, mesic Lithic Haploxeralfs |
| Weaverville | Fine-loamy, oxidic, mesic Ultic Palexeralfs |
| Weitchpec | Loamy-skeletal, serpentinitic, mesic Typic Xerochrepts |
| Weitchpec Variant | Clayey-skeletal, mixed, mesic Mollic Haploxeralfs |
| Xeralfs | Xeralfs |
| Xererts | Xererts |
| Xerofluvents | Xerofluvents |
| Xerorthents | Xerorthents |

☆ U.S. GOVERNMENT PRINTING OFFICE: 1997-417-266/60003

# Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

## Nondiscrimination Statement

### Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

### To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

### To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

### Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for

program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

**Supplemental Nutrition Assistance Program**

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

**All Other Inquiries**

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).

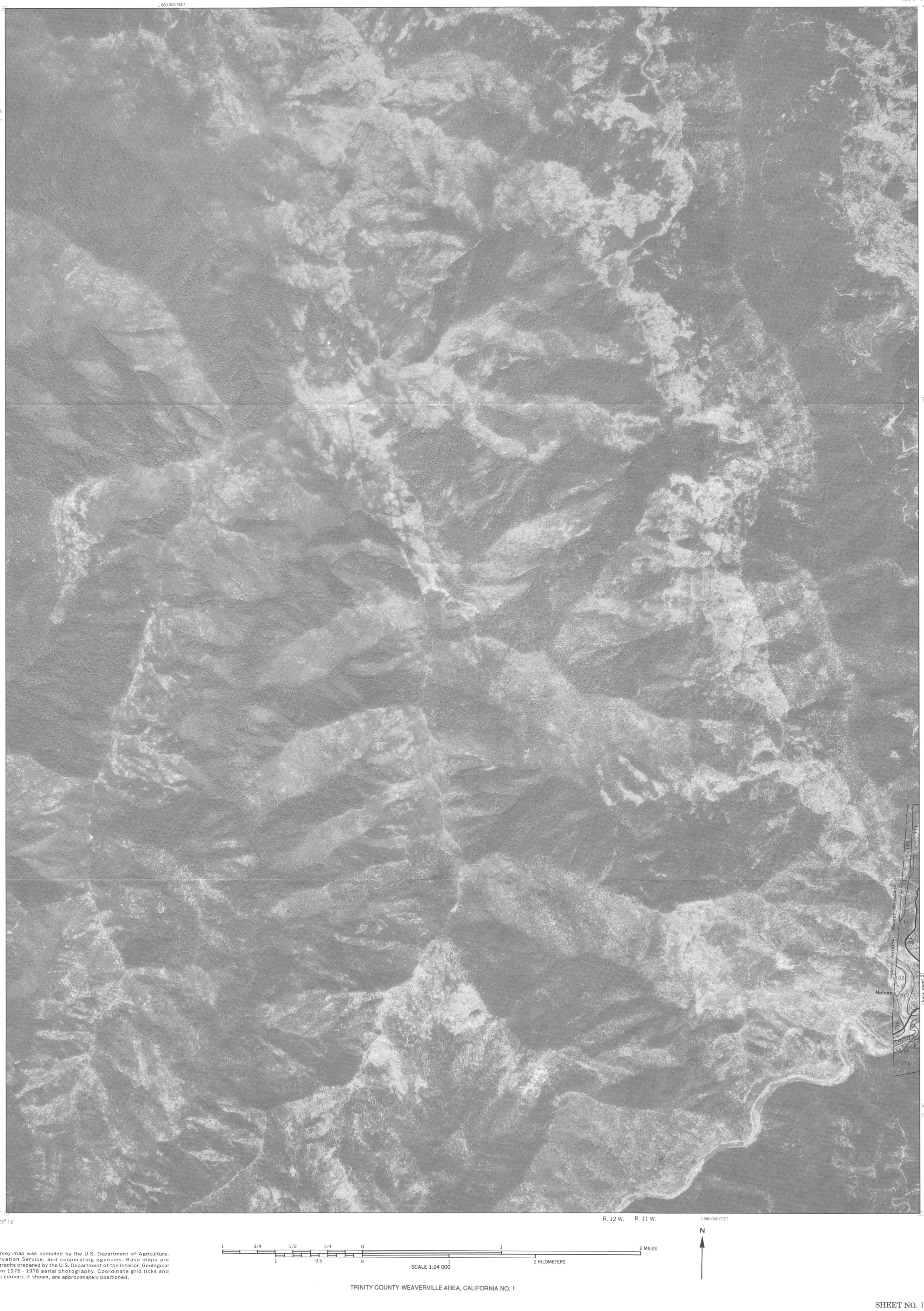
# SOIL SURVEY OF TRINITY COUNTY, CALIFORNIA
## WEAVERVILLE AREA
(HELENA QUADRANGLE)

1 660 000 FEET

123°07′30″

40°52′30″

560 000 FEET



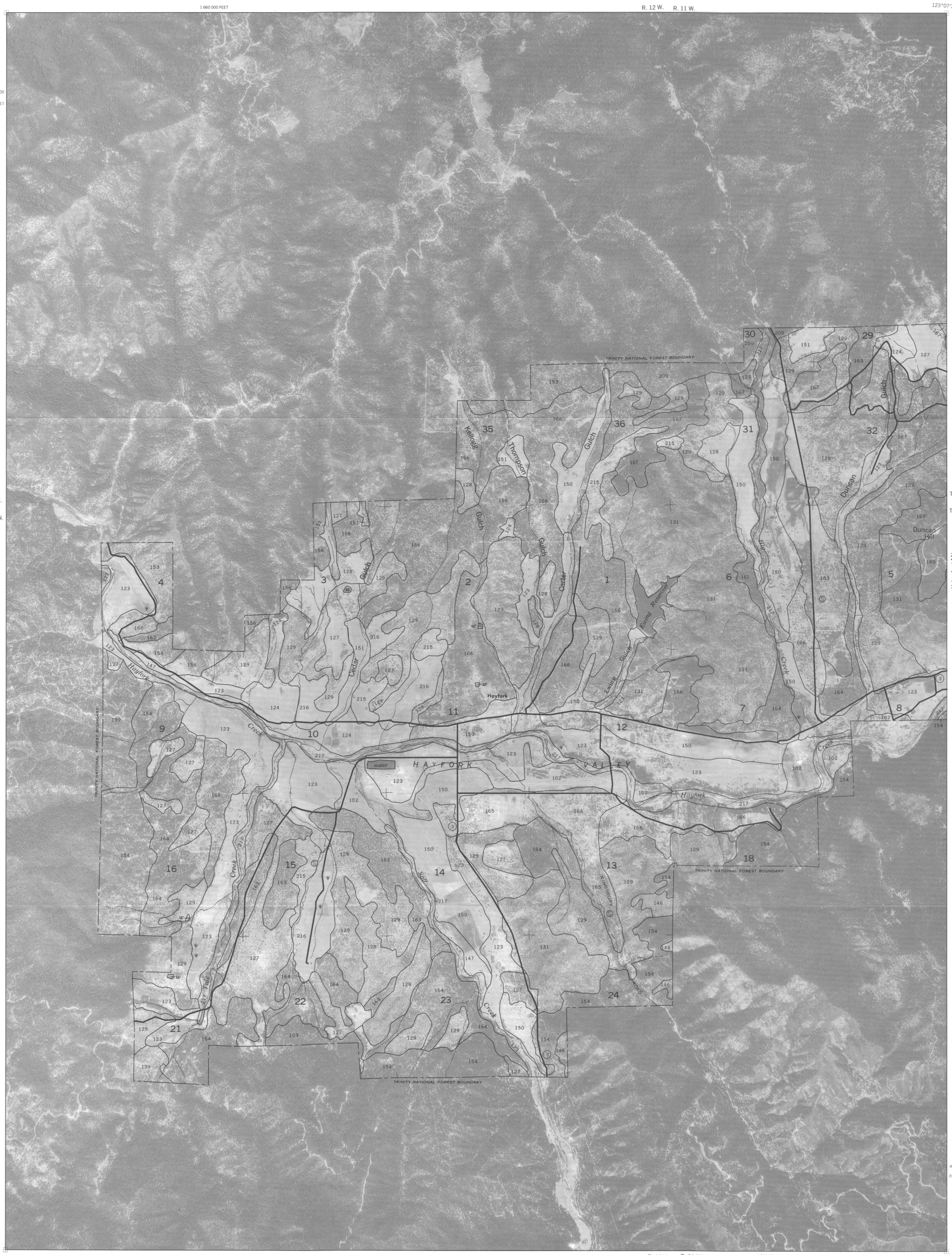

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 1

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 10
SOIL SURVEY OF TRINITY COUNTY, CALIFORNIA, WEAVERVILLE AREA
(HAYFORK QUADRANGLE)




This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 10

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 11
SOIL SURVEY OF TRINITY COUNTY, CALIFORNIA
WEAVERVILLE AREA
(HAYFORK SUMMITT QUADRANGLE)

1 690 000 FEET
470 000 FEET
R. 11 W. R. 10 W.
123°00′
40°37′30″
(Joins sheet 6)
(Joins sheet 12)
(Joins sheet 10)
T. 32 N.
T. 31 N.
TRINITY NATIONAL FOREST BOUNDARY
Hayfork Summitt
Barker Creek
Garden Gulch
Carr
Durgan Hill
Grapevine Gulch
Hayfork Creek
West Fork Carr Creek
East Fork Carr Creek
Maxwell Creek
430 000 FEET
40°30′
123°07′30″
1 720 000 FEET

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 11

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 12
SOIL SURVEY OF TRINITY COUNTY, CALIFORNIA
WEAVERVILLE AREA
(HOOSIMBIM MTN. QUADRANGLE)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO.12

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 13
SOIL SURVEY OF TRINITY COUNTY, CALIFORNIA
WEAVERVILLE AREA
(BULLY CHOOP MTN QUADRANGLE)

1 760 000 FEET
R. 9 W. R. 8 W.
(Joins sheet 7)
122°45′
40°37′30″
470 000 FEET

Old Man Gulch
Spring Gulch
Johnson Gulch
Mule Gulch
Joseph Creek
Indian Creek
Panwauket Gulch
Barleyfield Creek
Shoemaker Gulch
Reading Gulch
Bear Trap Gulch
Lake Gulch
Byron Gulch
Skunk Gulch
Little Bark Shanty Cr.
Joes Peak
Ards Peak
Corral Creek
Gruss Gulch
Talkeu Cr.
Barleyfield Peak
China
Gunsight Peak
Bully Choop Mountain
Crawfish Creek
Reading
TRINITY MOUNTAINS
TRINITY CO
SHASTA CO

T. 32 N.
T. 31 N.

(Joins sheet 12)
(Joins sheet 14)

(Joins sheet 16)
R. 9 W. R. 8 W.
1 790 000 FEET
40°30′
122°52′30″
430 000 FEET

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 13

(Joins sheet 8)

1 800 000 FEET

R. 8 W. R. 7 W.

122°37′30″

40°37′30″

470 000 FEET

Little Grass Valley Creek

Buckhorn Bally

SHASTA CO
TRINITY CO

Grass Valley Creek

Shoemaker Bally

Indian Cr.

TRINITY CO
SHASTA CO

T. 32 N.

T. 31 N.

(Joins sheet 12)

430 000 FEET

40°30′

122°45′

R. 8 W. R. 7 W.

1 820 000 FEET

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

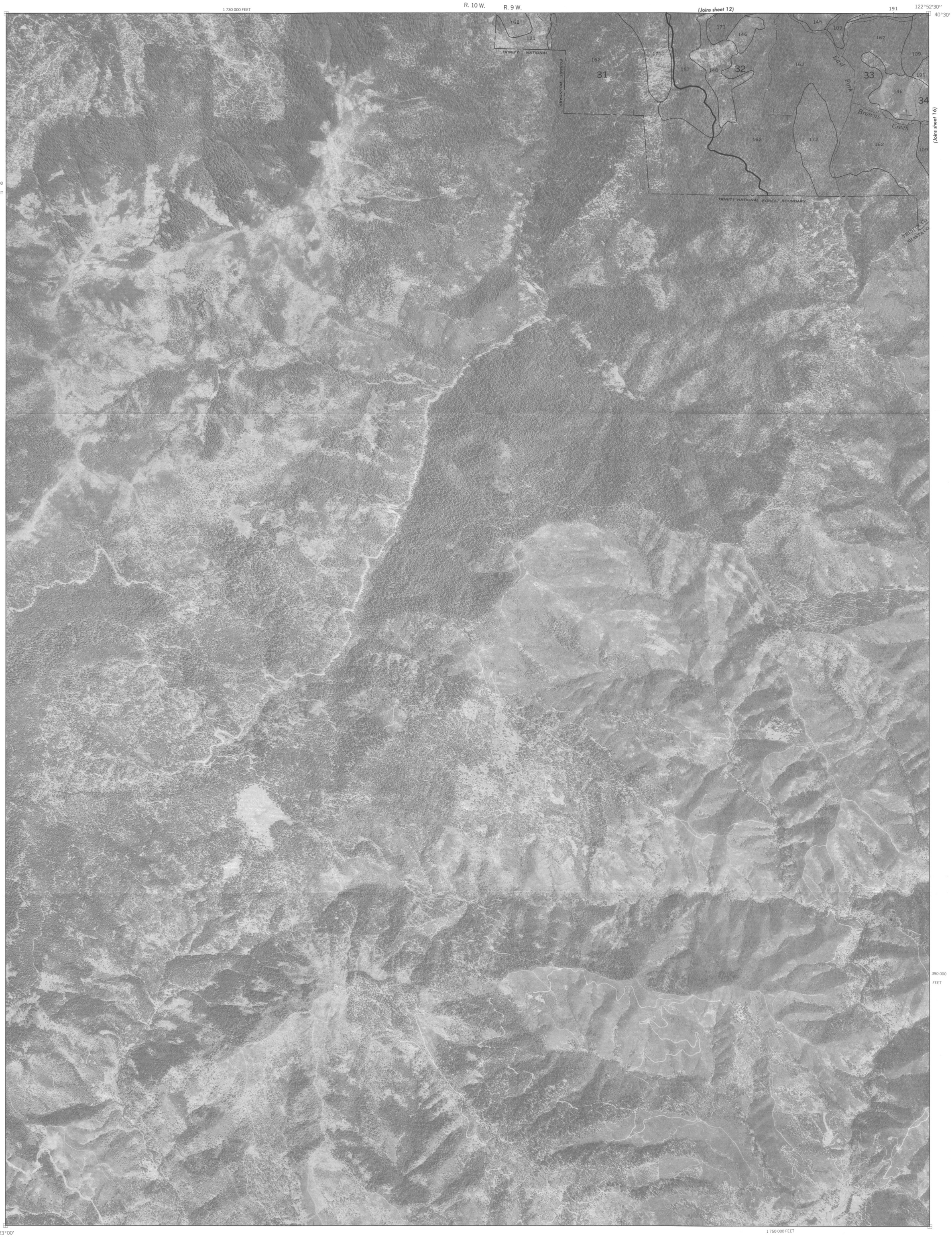
SCALE 1:24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 14

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 15
SOIL SURVEY OF TRINITY COUNTY, CALIFORNIA
WEAVERVILLE AREA
(CHANCHELULLA PEAK N.W. QUADRANGLE)




This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 15

(Joins sheet 13)

1 760 000 FEET

R. 9 W.

122°45′

40°30′

(Joins sheet 15)

420 000 FEET

SHASTA CO
TRINITY CO

109 110 34 191 35 109 146 146 East Fork Browns Creek 109 110 109 152

TRINITY CO
SHASTA CO

390 000 FEET

40°22′30″

122°52′30″

1 790 000 FEET

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 16

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 2
SOIL SURVEY OF TRINITY COUNTY, CALIFORNIA
WEAVERVILLE AREA
(DEDRICK QUADRANGLE)

1 690 000 FEET
R. 11 W. R. 10 W.
123°00′
40°52′30″
560 000 FEET
T. 35 N.
T. 34 N.

TRINITY NATIONAL FOREST BOUNDARY
Barney Gulch
Rich Gulch
Store Gulch
Fox Gulch
Brock Gulch
West Valdor Gulch
East Valdor Gulch
Pear Tree Gulch
Rarick Gulch
Conrad Gulch
Canyon Creek
Little Bally
Red Hill
Clear Gulch
Slattery Gl
TRINITY RIVER
(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 6)
520 000 FEET
T. 34 N.
T. 33 N.
1 720 000 FEET
40°45′
123°07′30″

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 2

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 3
SOIL SURVEY OF TRINITY COUNTY, CALIFORNIA
WEAVERVILLE AREA
(RUSH CREEK LAKES QUADRANGLE)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 3

1 760 000 FEET

122°45′

40°52′30″

560 000 FEET

T. 35 N.

T. 34 N.

(Joins sheet 3)

(Joins sheet 8)

(Joins sheet 5)

520 000 FEET

1 790 000 FEET

T. 35 N.

T. 34 N.

T. 34 N.

T. 33 N.

40°45′

122°52′30″

R. 9 W. R. 8 W.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 4

# SOIL SURVEY OF TRINITY COUNTY, CALIFORNIA
## WEAVERVILLE AREA
(PAPOOSE CREEK QUADRANGLE)

1 800 000 FEET

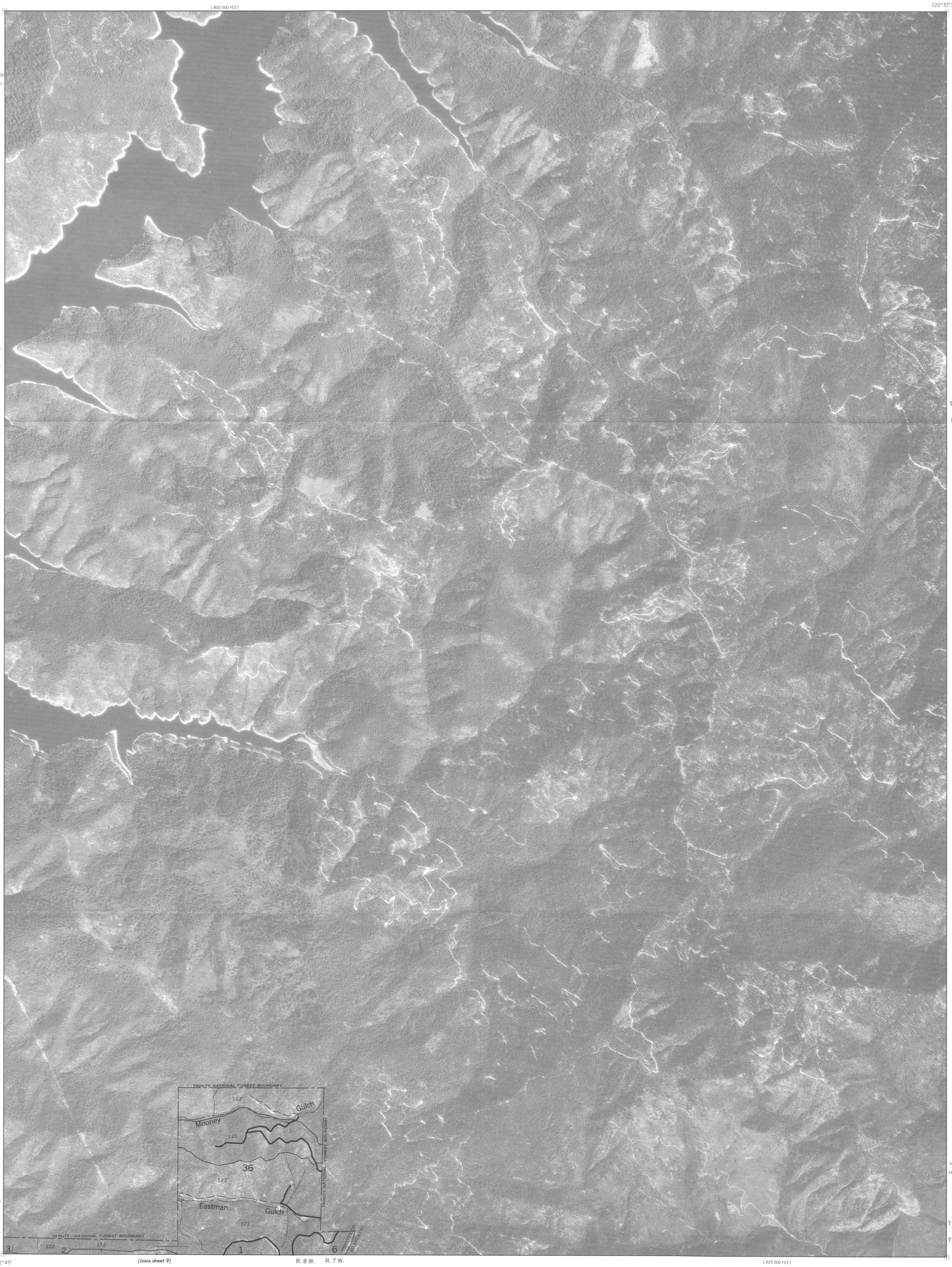
122°37′30″

40°52′30″

560 000 FEET

T. 35 N.

T. 34 N.




T. 35 N.

T. 34 N.

(Joins sheet 4)

520 000 FEET

T. 34 N.

T. 33 N.

40°45′

122°45′

(Joins sheet 9)

R. 8 W.

R. 7 W.

1 820 000 FEET

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 5

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 6
SOIL SURVEY OF TRINITY COUNTY, CALIFORNIA
WEAVERVILLE AREA
(JUNCTION CITY QUADRANGLE)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 6

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 7
SOIL SURVEY OF TRINITY COUNTY, CALIFORNIA
WEAVERVILLE AREA
(WEAVERVILLE QUADRANGLE)

1 730 000 FEET (Joins sheet 3) R. 10 W. R. 9 W. 122°52'30" 40°45'

510 000 FEET

(Joins sheet 6)

(Joins sheet 8)

T. 33 N.
T. 32 N.

480 000 FEET

40°37'30" 123°00' 205 R. 10 W. R. 9 W. (Joins sheet 12) 1 750 000 FEET

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 7

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 8
SOIL SURVEY OF TRINITY COUNTY, CALIFORNIA
WEAVERVILLE AREA
(LEWISTON QUADRANGLE)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 - 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 8

(Joins sheet 5)

1 800 000 FEET

R. 8 W. R. 7 W.

122°37'30"
40°45'

510 000 FEET

TRINITY CO
SHASTA CO

South Fork Eastman Gulch

Donnelly Creek

Thorne Gulch

Deadwood Gulch

Church Gulch

South Fork

Little Cross Valley

Eagle

SHASTA CO
TRINITY CO

(Joins sheet 8)

T. 33 N.
T. 32 N.

(Joins sheet 14)

40°37'30"
122°45'

1 820 000 FEET

480 000 FEET

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

TRINITY COUNTY-WEAVERVILLE AREA, CALIFORNIA NO. 9